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EFFICIENCY OF DIGITAL AND CASH PAYMENT SYSTEMS AND EFFECT ON CASH FLOW IN COFFEE SHOPS AROUND CAMPUS AREA

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ABSTRACT

The rapid advancement of financial technology, particularly within the culinary sector, has propelled a discernible shift in consumer preference toward digital payment systems. Coffee shop proprietors are consequently obliged to comprehend the implications of this shift for operational cash flow. This study aims to quantify the efficiency of digital and cash payment systems and to analyze the effect of their implementation on the smoothness of cash flow within coffee shop enterprises. The research was conducted across 35 coffee shops situated within the IPB Vocational School campus area, employing a quantitative approach that combines a composite efficiency index calculation with multiple linear regression analysis. The findings reveal that the digital payment system exhibits a markedly higher degree of efficiency than its cash-based counterpart. Both digital and cash payment systems were found to exert a simultaneous influence on coffee shop cash flow; however, when examined partially, only the digital payment system demonstrated a significant and positive effect on cash flow, whereas the cash payment system, despite yielding a positive coefficient, failed to reach statistical significance. This study is expected to furnish empirical evidence that can inform coffee shop operators in formulating strategic decisions regarding payment system selection.

Keywords: *cash flow; efficiency; payment system*

INTRODUCTION

The advancement of financial technology (fintech) has propelled a transformation of payment systems within Indonesia's culinary sector, a development evidenced by the 208 companies registered under the Indonesian Fintech Association alongside the expansion of QRIS and BI-FAST, both of which have reinforced retail transactions (Asosiasi Fintech Indonesia, 2025). QRIS transaction volume reached 2.6 billion transactions in the first quarter of 2025, marking a 594% increase relative to the corresponding period in 2023, with 59.53 million users and 42.75 million merchants recorded in the fourth quarter of 2025 (Bank Indonesia, 2025). This growing adoption of digital payment aligns with the rapid expansion of Indonesia's coffee shop industry, which recorded 461,991 business locations according to Point of Interest data (Fithriana, 2026). The proliferation of coffee shops is attributable not merely to production-side factors but also to a broader shift in the lifestyle of Indonesian society, particularly among the

younger generation. The campus environment, as an ecosystem dominated by younger generations, exhibits a high concentration of coffee shops catering to the diverse payment preferences of students, lecturers, and administrative staff. Business operators who adopt fintech-based payment methods have been shown to garner greater consumer trust, owing to the perception that such methods are safer and more practical, which in turn translates into enhanced customer loyalty and sales performance (Yarisma et al., 2025).

A preliminary survey conducted by the researcher among coffee shops within the IPB Vocational School campus area reveals an adoption pattern worthy of closer scrutiny. Although every coffee shop surveyed has implemented a digital payment system, the composition of adoption is bifurcated into two groups: 30 percent have transitioned entirely to a fully digital system and no longer accept cash payments whatsoever, whereas the remaining 70 percent continue to maintain a hybrid system that combines digital and cash payment methods. This persistence of a hybrid model, rather than a full transition, is not necessarily irrational: cash continues to function as an operational safeguard against network outages and system downtime, a concern also documented among traditional payment users who cite system failure as a reason for retaining in-person transactions (Bastes et al., 2025), and is perceived by operators as more universally usable and trustworthy under conditions where digital infrastructure is unreliable (Ortiz et al., 2023). This variation in adoption patterns constitutes the central urgency of the present study: if the digital payment system is indeed superior in terms of efficiency and more conducive to smooth cash flow, the question that arises is why the majority of business operators (70 percent) have not yet fully transitioned and continue to retain cash as a complementary method. This condition suggests that the decision to maintain a hybrid system may be grounded in practical considerations that have yet to be quantitatively measured, thereby necessitating empirical evidence regarding the relative efficiency of, and the tangible effect exerted by, each payment system on the operational cash flow of coffee shops.

A number of related studies serve as reference points for the current state of knowledge on this topic. Gaonkar and Krishna (2024) demonstrated that digital payment significantly enhances operational efficiency, customer satisfaction, and revenue among small-

scale coffee businesses in India. Ramadhan & Afandi, (2025) found that QRIS effectively facilitates digital transactions at coffee shops, notwithstanding persistent obstacles related to digital literacy, internet connectivity, and transaction costs. Agustian, (2025) further added that digital payment exerts a positive effect on the financial performance of micro, small, and medium enterprises (MSMEs), provided that it is accompanied by adequate financial and technological literacy.

Nevertheless, these studies collectively reveal three unaddressed gaps: a comparative gap, as digital adoption has rarely been tested head-to-head against cash within the same operational context, despite the preliminary survey above showing the two systems operate side by side in most coffee shops; a financial-variable gap, as prior evaluations remain confined to aggregate revenue rather than specific cash flow components; and a methodological gap, as most studies rely on qualitative description rather than quantitative measurement.

The novelty of this study lies in addressing these three gaps simultaneously. Grounded in efficiency theory Heizer et al., (2017) it directly compares digital and cash payment efficiency through a Composite Efficiency Index and quantitatively tests both systems simultaneous and partial effects on cash flow an approach not yet applied within a single coffee shop operational setting.

Based on this description, the purpose of this study is to answer: (1) whether a significant difference exists between the efficiency of digital and cash payment systems, and (2) how the implementation of both systems affects coffee shop cash flow, whether simultaneously or partially.

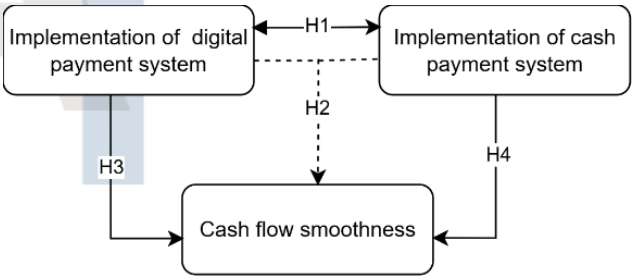

Figure 1. **Relationship Between Variable**

The hypotheses tested are as follows: H1, a difference exists between the efficiency of digital and cash payment system implementation; H2, the implementation of digital and cash payment systems affects the smoothness of cash flow; H3, the implementation of the digital payment system exerts a significant effect on the smoothness of cash flow; and H4, the implementation of the cash payment system exerts a

significant effect on the smoothness of cash flow.

LITERATUR REVIEW

Efficiency

Heizer et al., (2017) define efficiency as the ratio between output generated and input utilized, one that simultaneously enhances four operational dimensions, namely speed, flexibility, quality, and cost structure. Efficiency concerns doing things correctly, that is, maximizing input, whereas effectiveness concerns doing the correct things (Robbins et al., 2018). Within the context of service systems, the degree of efficiency is measured through perceptions of process quality, given that its output cannot be quantified physically in the manner of production units (Fitzsimmons et al., 2022). Because efficiency is defined by measurable differences across the dimensions of speed, cost, accuracy, and reliability two systems that differ structurally in how they perform these function. As digital and cash payment inherently do should, in principle, exhibit a measurable difference in composite efficiency score.

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) Martin, (2022) explains that technology acceptance is shaped by perceived usefulness and perceived ease of use. TAM provides the theoretical foundation for why measuring payment implementation variables through the perceptions of business operators constitutes a valid approach, given that the adoption of payment technology is determined predominantly by users' internal perceptions of benefit and convenience rather than by external factors such as business location. TAM is invoked here in a narrower, supporting capacity it justifies measuring payment system implementation through operators' perceptions rather than objective transaction logs, since technology-related behavior is shaped predominantly by users' internal perceptions of usefulness and ease of use. It does not, however, model the relationship between payment system efficiency and cash flow, which this study derives from efficiency theory instead.

Coffee Shop Industry

The modern coffee shop integrates product, service, and atmosphere into a unified value proposition offered to its patrons. Recent research continues to draw on the third place concept to explain the coffee shop's role as a hub of community life, describing such venues as informal social space distinct from home

and workplace that foster socialization, inclusivity, and a sense of belonging among their users (Makhathini & Kanosvamhira, 2025). Within campus environments, coffee shops have further evolved into informal learning spaces for students, with utilitarian motivation and the availability of physical facilities shown to exert a positive effect on student engagement (Adityawirawan & Kusuma, 2021).

Digital and Cash Payment Systems

An efficient payment system is capable of processing transactions swiftly, accurately, securely, and at affordable cost (Kashmir, 2019). Digital payment refers to payment conducted through electronic media that renders transactions more practical, rapid, and accurate, offering distinct advantages in terms of usefulness, security, and ease of use (Fitzsimmons et al., 2022). Nevertheless, dependence on internet connectivity and exposure to cybersecurity risk remain persistent constraints (Ortiz et al., 2023). Cash payment, by contrast, is conducted directly without any electronic intermediary, rendering it usable under a wide range of conditions and perceived as superior in terms of trustworthiness and convenience (Ortiz et al., 2023). Effective cash management under either system encompasses a business's capacity to accurately control cash inflows and outflows while maintaining liquidity (Kashmir, 2019). These operational characteristics translate directly into cash flow outcome, a system that records and settles transactions faster, more accurately, and at lower risk of error should correspondingly improve an operator's ability to monitor and forecast cash position the very properties that define cash flow smoothness (Lulaj & Minguez-Vera, 2024).

Cash Flow Smoothness

Operating activities within the cash flow statement encompass the cash effects of transactions that generate revenue and expense (Kieso et al., 2019). The cash flow statement serves to assess an entity's capacity to generate cash, meet its obligations, and finance its operational activities (Pernyataan Standar Akuntansi Keuangan, 2022). Cash flow smoothness in this study refers to the extent to which cash receipts and disbursements occur in a timely, accurate, monitorable, and predictable manner, as measured through four indicators: the speed of cash receipt, the accuracy of record-keeping, the ease of monitoring, and the predictability and planning of cash (Lulaj & Minguez-Vera, 2024).

Linkage between Payment Systems and Cash Flow Smoothness

Gaonkar & Krishna, (2024) demonstrated that digital payment exerts a positive impact on the operational efficiency of micro-scale coffee businesses. Ramadhan & Afandi, (2025) found that the effectiveness of QRIS is likewise shaped by digital literacy, internet connectivity, and transaction cost. Drawing on this body of theory and prior research, it is hypothesized that the implementation of digital and cash payment systems differs in terms of efficiency and exerts an effect on the smoothness of coffee shop cash flow, whether simultaneously or partially.

RESEARCH METHOD

This study was conducted at coffee shops within the IPB Vocational School campus area between February and April 2026 for the purpose of primary data collection. The research population comprised the entirety of coffee shops located within that area, with sampling carried out through a purposive technique based on the following criteria: location within the campus area, concurrent use of both cash and digital payment systems, and respondents drawn from internal parties possessing a thorough understanding of the payment process (owners, cashiers, or supervisors). Following the rule-of-thumb guideline of at least 10 participants per predictor variable (Seabrook, 2025; Hair et al., 2019), a minimum of 20 respondents was required for the two-predictor regression model. This minimum was increased to 35 to anticipate potential invalid or incomplete responses during data collection. A sensitivity power analysis for the two-predictor regression model ($df1 = 2$, $df2 = 32$, $\alpha = 0.05$) confirms that $N = 35$ is sufficient to detect a medium-to-large effect ($f^2 \geq 0.303$, equivalent to $R^2 \geq 0.232$) at 80% power a threshold consistent with effect sizes reported in comparable prior research on digital payment's operational impact (Gaonkar & Krishna, 2024).

Primary data were collected through a closed-ended questionnaire employing a five-point Likert scale (ranging from strongly disagree to strongly agree), while secondary data were obtained from relevant journals, books, and official publications.

Table 1. Operational Definition

Variable	Operational Definition	Indicator
Implementation of the Digital Payment System	A system comprising the regulations, contracts, technical infrastructure, and facilities that serve	1. Speed of recording and disbursement 2. Operational cost

Variable	Operational Definition	Indicator
	as the means of transmitting, authorizing, and instructing payments, facilitating the exchange of value between individuals or institutions through channels such as QRIS, e-wallets, and mobile banking.	3. Accuracy and minimal error 4. Reliability and ease of management
Implementation of the Cash Payment System	The application of a payment method using physical currency (banknotes and coins) handed directly to the seller at the point of transaction, without the mediation of electronic devices or digital systems.	1. Speed of transaction and recording 2. Operational cost 3. Accuracy and minimal error 4. Reliability and ease of management
Cash Flow Smoothness (Y)	The condition in which cash inflow from a business's core operating activities namely cash receipts generated from product sales transactions to customers occurs without disruption.	1. Speed of cash receipt 2. Accuracy of cash recording 3. Ease of cash monitoring and control 4. Predictability and planning of cash

Source: (Lulaj & Minguez-Vera, 2024; Syahda et al., 2024; Syahreza & Amelia, 2025)

The data analysis technique employed in this study requires that every instrument first undergo validity and reliability testing. The validity test employs the Pearson Product Moment correlation, which measures the closeness of the relationship between the score of each statement item and the total score of its corresponding variable; an instrument is deemed valid where the calculated R-value exceeds the tabulated R-value (Sugiyono, 2022). The reliability test employs Cronbach's Alpha, which indicates the internal consistency among statement items within a single variable, with the criterion for passing the reliability test set at an alpha value of ≥ 0.60 (Bougie & Sekaran, 2020).

The degree of efficiency of each payment system was calculated using a Composite Efficiency Index (CEI) derived from the arithmetic mean of respondents' perception scores Mazziotta & Pareto, (2022) subsequently converted into a percentage of the maximum possible scale score.

$$CEI = \frac{X}{Xmax}$$

Where X denotes the arithmetic mean of respondents' perception scores across all indicators of the variable being measured (digital or cash payment implementation), and X max denotes the maximum possible score attainable on the five-point Likert scale used in this study (i.e., a score of 5 for every indicator). A higher CEI value indicates a higher perceived degree of efficiency for the payment system in question.

Thereafter, in order to statistically ascertain the difference in efficiency, a difference test was conducted on the basis of the Shapiro-Wilk normality test applied to the score differential: where the data were found to be normally distributed, a paired-samples t-test was employed, whereas where the data departed from normality, the Wilcoxon Signed-Rank Test was applied, with effect size computed through the formula:

$$r = \frac{Z}{\sqrt{N}}$$

Prior to conducting the multiple regression analysis intended to measure the effect of X1 and X2 on Y, classical assumption testing was carried out to ensure that the model satisfied the Best Linear Unbiased Estimator property (Ghozali, 2018). The classical assumption tests comprised normality testing, multicollinearity testing through Tolerance and VIF values, and heteroscedasticity testing through the Glejser test.

The multiple linear regression analysis was conducted using the following equation:

$$Y = \alpha + \beta 1X1 + \beta 2X2 + e$$

Where Y denotes cash flow smoothness; α denotes the constant; β1 and β2 denote the regression coefficients; X1 and X2 denote the implementation of the digital and cash payment systems, respectively; and ε denotes the error term.

Ghozali, (2018) contends that the accuracy of the sample regression function in estimating actual values can be measured through goodness of fit, which is statistically reflected in the coefficient of determination, the F-statistic, and the t-statistic. The correlation coefficient (R) indicates the closeness of the joint relationship between the independent variables and the dependent variable. The coefficient of determination (R Square) indicates the proportion of the independent variables, taken jointly, within the model, with values ranging from 0 to 1. However, given that the R Square value tends to increase as additional independent variables are introduced, even where such variables are not significant, this study instead employs the adjusted R Square as a more appropriate measure of model evaluation, since its value does not fluctuate in accordance with each variable's individual contribution (Ghozali, 2018).

The significance of the effect was subsequently tested using SPSS, on a simultaneous basis through the F-test, whereby H0 is rejected—indicating that the independent variables jointly exert a significant effect—where the significance value is less than 0.05. On a partial basis,

the effect was tested using the t-test, whereby H0 is likewise rejected—indicating that an independent variable individually exerts a significant effect—where the significance value is less than 0.05.

RESULT AND DISCUSSION

Descriptive Analysis of Respondent

This study involved 35 respondents drawn from coffee shop operators within the IPB Vocational School campus area, with data collected between March to April 2026.

Table 2. Respondent Characteristics

Characteristics	Category	Percentage
Proportion of Digital	Cash-Dominant	11,4%
	Balanced	11,4%
	Digital-Dominant	77,1%
Average transaction per day	< 50 transactions	28,6%
	50 - 100 transaction	51,4%
	> 100 transactions	20,0%
Duration of Digital Usage	< 6 months	20,0%
	6 year	2,9%
	> 1 year	77,1%
Distance to Campus	< 1 km	37,1%
	1 - 5 km	62,9%
	> 5 km	0,0%
Type of Payment System	QRIS	100%
	Debt card/credit Card/EDC	68,6%
	Mobile Banking	42,9%
	E-wallet	17,1%

Based on respondent characteristics, 77.1 percent of coffee shops employ the digital payment system as their dominant method, while only 11.4 percent remain cash-dominant and a further 11.4 percent employ both methods in balanced proportion. In terms of transaction volume, the majority serve between 50 and 100 transactions per day (51.4 percent). Some 77.1 percent of respondents have used the digital system for more than one year, indicating that the questionnaire responses stem from experienced users rather than from parties still in the adaptation phase. The entire sample was located within a maximum radius of 5 km from the SV IPB campus, thereby satisfying the established purposive sampling criteria.

This predominance of digital-dominant operators is consistent with the near-universal QRIS adoption observed across the sample (100 percent) and the maturity of that adoption, as 77.1 percent of respondents reported more than one year of digital payment experience indicating a campus environment where digital payment has moved past initial trial into routine institutional practice, plausibly supported by the area's proximity to reliable network infrastructure. This composition, however, carries an interpretive caveat: because digital-dominant operators substantially outnumber cash-dominant and balanced operators (11.4 percent each), the resulting sample skews toward respondents who have already experienced sustained success with digital

payment. Perception-based efficiency scores, particularly the composite efficiency index for digital payment, should therefore be read with this skew in mind, as the relatively small subgroup of cash-dominant and balanced operators limits the extent to which cash payment's perceived efficiency and cash flow contribution can be considered fully representative of operators less inclined toward digital adoption.

Validity and Reliability Test

With a respondent count of N = 35 and a significance level of α = 0.05, the tabulated R-value applied was 0.334. The test results indicate that every statement item within the variables Implementation of the Digital Payment System (X1) and Cash Flow Smoothness (Y) was deemed valid. Within the variable Implementation of the Cash Payment System (X2), one item (X2.7) was eliminated, as its calculated R-value of 0.233 failed to satisfy the minimum tabulated R-value threshold, thereby reducing the number of valid items in variable X2 to seven. Unlike the other items within this dimension, which ask respondents to evaluate the ease and manageability of cash payment based on their operational experience, item X2.7 ("the cash payment system can be relied upon under all conditions because it does not depend on network signal") describes an objective technical characteristic of cash rather than a subjective evaluation of its manageability. Respondents' agreement with this factual claim may accordingly rest on a different basis than their broader assessment of cash's operational reliability, which likely explains why the item's scores (M = 3.97, SD = 0.79) failed to covary consistently with the variable's total score despite exhibiting a normal response spread.

Table 3. Reliability Test Results

Variable	Cronbach's Alpha	Threshold
Implementation of the Digital Payment System	0.864	0.60
Implementation of the Cash Payment System	0.836	0.60
Cash Flow Smoothness	0.888	0.60

The reliability test was conducted using the Cronbach's Alpha method, with an instrument deemed reliable where the α value exceeds 0.60 (Sugiyono, 2022)

Every variable obtained a Cronbach's Alpha value above 0.60 (Bougie & Sekaran, 2020); accordingly, all instruments were deemed reliable and suitable for use in subsequent testing.

Classical Assumption Test

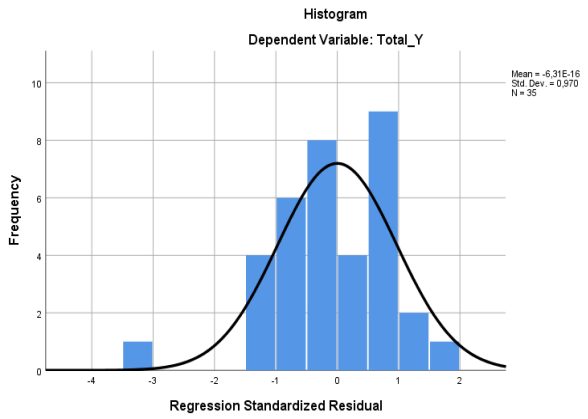

Figure 2. Normality Test Histogram

As illustrated by the histogram, the shape of the curve indicates that the residual distribution approximates a bell-shaped curve. This condition reflects that the model's residuals are centered around zero, as required under the normality assumption of multiple linear regression. Furthermore, the classical assumption test confirms that the regression model satisfies this requirement, with residuals normally distributed at a Shapiro-Wilk value of 0.129 > 0.05.

Table 4. Multicollinearity Test Results

Variable	Tolerance	VIF
Implementation of the Digital Payment System	0.701	1.427
Implementation of the Cash Payment System	0.701	1.427

Both independent variables recorded a Tolerance value of 0.701 > 0.10 and a VIF value of 1.427 < 10, indicating that the regression model is free from multicollinearity. The identical Tolerance and VIF values observed across the two variables arise because both measure payment systems within the same operational context, such that it is unsurprising for a respondent who rates one variable favorably to likewise rate the other.

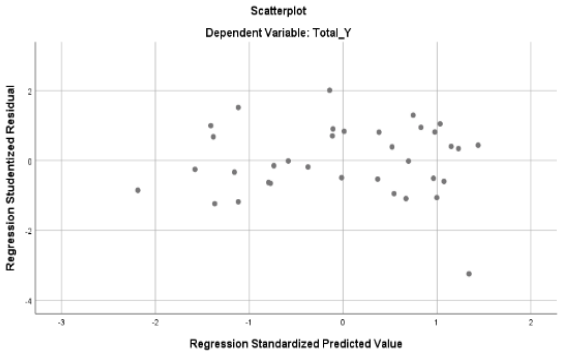

Figure 3. Heteroscedasticity Test Scatterplot

Ghozali (2018) states that a regression model is deemed free from heteroscedasticity where the points on the scatterplot are randomly dispersed and fail to form any discernible pattern above or below zero on the Y-axis. This observation was cross verified against the results of the Glejser test, which yielded a significance value of 0.513 > 0.05 for X1 and 0.94 > 0.05 for X2, indicating that neither independent variable exerts a significant effect on the absolute residual value. Heteroscedasticity is therefore absent from the regression model.

Payment System Efficiency Analysis

Table 5. Composite Efficiency Index

Efficiency Indicator	Digital (X1)	Cash (X2)
Recording and disbursement speed	4.20	3.84
Operational cost	3.57	3.90
Accuracy and minimal error	4.07	3.57
Reliability and ease of management	4.46	3.77
Composite Efficiency Index (%)	81.5%	75.4%

The table indicates an efficiency index of 81.5 percent for the digital payment system and 75.4 percent for the cash payment system, signifying that the level of digital efficiency exceeds that of cash. This comparison demonstrates that respondents perceive the digital payment system as more efficient than the cash payment system, with a differential of 6.1 percentage points between the two indices. The digital payment system outperforms cash on three of the four efficiency dimensions, with the largest gap observed in reliability and ease of management, while the cash payment system holds an advantage solely in the dimension of operational cost. This cost advantage for cash payment is plausibly attributable to the Merchant Discount Rate (MDR) imposed on QRIS transactions, a per-transaction service fee borne directly by the merchant under Bank Indonesia's prevailing tariff structure, which operators are likely to perceive as an immediate and recurring cost each time a digital transaction occurs. Cash payment, by contrast, carries no equivalent explicit transaction fee, even though it entails less visible costs of its own such as the time required for manual reconciliation and the risk of cash discrepancies that are less immediately salient to operators at the point of transaction.

This advantage arises because the digital system processes transactions automatically without requiring manual calculation, thereby minimizing the risk of errors commonly associated with cash transactions, such as miscalculated change or discrepancies in cash balances. Moreover, the automatic reporting features embedded within digital platforms such as QRIS and e-wallets enable operators to monitor cash flow in real time, at any time and from any location, without needing to await end-of-day reconciliation. This capability proves particularly relevant for coffee shops operating under high transaction intensity, especially during peak hours, when service speed exerts a direct bearing on customer satisfaction.

Table 6. Normality Test Results

Statistic	D (Total X1 − Total X2)
Mean	6.2
Std. Deviation	5.1
Test Statistic	0.936
Sig.	0.043

Prior to conducting the difference test, a normality test was first performed on the differential of the composite efficiency scores between the digital and cash payment systems (D = Total X1 − Total X2), in order to determine the appropriate statistical test. Given that the study's sample size comprised 35 respondents (N < 50), the Shapiro-Wilk test was adopted as the reference normality test (Ahadi et al., 2023).

The test results yield a significance value of 0.043 (< 0.05), indicating that the efficiency scores of differential data are not normally distributed. On this basis, the parametric test (paired-samples t-test) could not be applied, and the difference test was instead conducted using the non-parametric Wilcoxon Signed-Rank Test.

Table 7. Wilcoxon Signed-Rank Test Results

Condition	N	Mean Rank	Sum of Ranks
Negative ranks (Total X2 < Total X1)	31	17.81	552.00
Positive ranks (Total X2 > Total X1)	2	4.50	9.00
Ties (Total X2 = Total X1)	2	–	–
Total	35		

The test results reveal that 31 respondents (88.6 percent) rated digital efficiency higher than cash efficiency (negative ranks), whereas only 2 respondents (5.7 percent) exhibited the reverse pattern (positive ranks), and a further 2 respondents (5.7 percent) rated both systems as equivalent (ties) and were consequently excluded from the rank calculation, yielding an effective N of 33 data pairs. This finding is consistent with the results of the Composite Efficiency Index (CEI) calculation, in which the digital CEI value (81.5 percent) was recorded as higher than the cash CEI value (75.4 percent). The consistency between

The pattern observed at the aggregate CEI level and that observed at the individual level (negative/positive ranks) reinforces the validity of the finding that digital superiority is likewise reflected in the evaluative pattern of the majority of individual respondents.

Table 8. Effect Size Result

Statistic	Total X2 − Total X1
Z	-4.858
r	0.821

Statistic	Total X2 − Total X1
Asymp. Sig. (2-tailed)	0.000

The effect size of r = 0.821 falls within the large category Fiel Peres, (2025) leading to the acceptance of H1, namely that a significant and substantial difference exists between the efficiency of the digital and cash payment systems. As the significance value is smaller than 0.05 (0.000 < 0.05), H1 is accepted. A significant difference is therefore confirmed between the efficiency levels of the digital payment system (X1) and the cash payment system (X2), accompanied by an effect size classified as large.

Gaonkar & Krishna, (2024) similarly concluded that digital payment meaningfully improves operational efficiency relative to cash-based handling among small coffee businesses, and Ramadhan & Afandi, (2025) reported that QRIS-based digital transactions facilitate smoother operational flow than manual cash processes. A direct numerical comparison of effect-size magnitude across these studies is not feasible, as prior research in this area predominantly reports findings in narrative or correlational form rather than a standardized effect-size metric comparable to the Wilcoxon r used here; nonetheless, the consistency in direction across studies employing different populations and methods strengthens confidence that the efficiency gap observed in this study reflects a genuine and generalizable pattern rather than a context-specific artifact.

Analysis of the Effect of Payment System Implementation on Cash Flow Smoothness

Table 9. Multiple Linear Regression Analysis Result

Model	B	Std. Error	Beta	Sig.
(Constant)	11.961	4.623		0.014
Total X1	0.417	0.142	0,476	0.006
Total X2	0.241	0.163	0,240	0.149

Based on the table above, the following multiple linear regression equation was obtained:

$$Y = 11.961 + 0.417X1 + 0.241X2$$

The interpretation of this regression equation is as follows: (1) The constant (α) indicates that the variables Implementation of the Digital Payment System (X1) and Implementation of the Cash Payment System (X2) are both equal to zero, the operational cash flow of the coffee shop is predicted to stand at a value of 11.961. This positive constant demonstrates that even in the absence of any contribution from either payment system, a positive baseline cash flow value nonetheless exists, suggesting that coffee shop cash flow is also shaped by factors external to the payment system,

such as daily sales volume, inventory management, and pricing strategy; (2) The coefficient of X1 (β1) indicates that each one-unit increase in the efficiency of the digital payment system raises cash flow by 0.417 units, holding other variables constant (ceteris paribus). This positive direction confirms that the better the digital payment system implemented, the more favorable the operational cash flow condition of the coffee shop; (3) The coefficient of X2 (β2) indicates that each one-unit increase in the efficiency of the cash payment system raises cash flow by 0.241 units, holding other variables constant. The smaller magnitude of the X2 coefficient relative to X1 indicates that the contribution of the digital payment system to cash flow is more dominant than that of the cash payment system.

Table 10. Coefficient of Determination Results

Model	R	R Square	Adjusted R Square	Std. Error
1	0.639	0.409	0.372	3.886

As shown in the table, the multiple correlation coefficient (R) was found to be 0.639, which, according to the interpretation guidelines of Sugiyono (2022), falls within the strong category (range of 0.60–0.799), indicating a strong joint relationship between the digital payment system (X1) and the cash payment system (X2) with respect to cash flow smoothness (Y). The Adjusted R Square value of 0.372 indicates that the two independent variables, taken jointly, are able to explain 37.2 percent of the variation in coffee shop cash flow within the IPB Vocational School's campus area, with the remaining 62.8 percent attributable to variables beyond the scope of this research model.

Table 11. T-Test and F-Test Results

Test	Value	Sig.	Description
F-test (Simultaneous)	F = 11.070	0.000	Significant
t-test	t = 2.933; β = 0.476	0.006	H3 Accepted
t-test	t = 1.477; β = 0.240	0.149	H4 Rejected

Based on the ANOVA table, the calculated F-value was found to be 11.070, with a significance value of 0.000 < 0.05. The tabulated F-value at df1 = 2 and df2 = 32, with α = 0.05, is 3.295, such that the calculated F (11.070) exceeds the tabulated F (3.295). This result confirms the acceptance of H2, meaning that the implementation of the digital payment system (X1) and the cash payment system (X2) jointly exerts a significant effect on the cash flow smoothness (Y) of coffee

shops within the SV IPB campus area. On a partial basis, the digital payment system exerts a positive and significant effect on cash flow (t = 2.933 > t-table 2.037; Sig. = 0.006), leading to the acceptance of H3. The standardized Beta value of 0.476 indicates the dominant contribution of the digital system to cash flow; its automatic recording and real-time reporting features enable operators to monitor daily cash positions, forecast cash receipts, and mitigate the risk of fraud. By contrast, the cash payment system does not exert a significant partial effect (t = 1.477 < t-t-t-t-t-table 2.037; Sig. = 0.149), leading to the rejection of H4. Although the direction of its coefficient remains positive, its effect proves insufficiently robust a finding consistent with the fact that 77.1 percent of respondents already rely on digital payment as their primary method, such that the contribution of cash no longer constitutes a significant differentiating factor.

Theoretical and Practical Implication

The findings of this study carry practical implications for coffee shop operators. Theoretically, these findings extend efficiency theory (Heizer et al., 2017) into the payment-system context while also revealing its limits. Digital payment outperforms cash on three of the four efficiency dimensions — speed, accuracy, and reliability — consistent with the theoretical expectation that automation reduces processing time and error. However, cash retains a distinct advantage in operational cost (3.90 vs. 3.57), indicating that efficiency does not improve uniformly across dimensions: transaction fees inherent to digital platforms (e.g., merchant discount rates) can offset the gains automation provides elsewhere. This finding nuances a purely automation-favors-efficiency reading of the theory and points instead to dimension-specific trade-offs that operators must weigh individually rather than assuming digital superiority across the board.

A second theoretical implication concerns the divergence between perceived efficiency and actual financial effect. While the CEI results and Wilcoxon test establish a large, significant efficiency gap favoring digital payment (H1), the regression results show that only digital payment exerts a significant partial effect on cash flow smoothness, whereas cash payment's positive coefficient falls short of significance (H3 rejected). This divergence illustrates that perceived efficiency (an attitudinal construct, closer to the perceptual basis TAM was invoked to justify in this study's measurement

approach) and realized financial outcome (a behavioral, output/input construct central to efficiency theory) are empirically distinct and need not move in tandem. A distinction the theoretical framework of this study makes explicit but which prior research on digital payment adoption Gaonkar & Krishna, (2024); Ramadhan & Afandi, (2025) did not separately test.

Practically, these findings offer four implications for coffee shop management. First, operators are advised to prioritize digital payment as the primary transaction method, but selectively: given that cash retains a cost advantage, operators should favor low-cost-structure digital platforms (e.g., QRIS providers with a low merchant discount rate) rather than adopting digital payment indiscriminately, particularly for businesses with lower daily transaction volume where fee costs weigh more heavily against thin margins. Second, because reliability was the dimension with the largest digital advantage, operators handling high transaction intensity — particularly during peak hours — stand to gain the most from prioritizing digital adoption, as real-time reporting reduces the reconciliation burden precisely when transaction volume is highest.

Third, cash should be retained deliberately as a backup within a hybrid system, both because it protects against network outages and system downtime and because, per this study's results, its contribution to cash flow smoothness is not statistically distinguishable from zero — meaning operators lose little in cash flow terms by minimizing, rather than eliminating, cash's operational role. Fourth, because digital and cash payment together explain only 37.2 percent of the variation in cash flow (Adjusted R^2 = 0.372), operators should not treat payment-system optimization as a sufficient lever on its own; cash flow smoothness likely also depends on factors such as daily sales volume, inventory management, and academic-calendar-driven demand seasonality, which fall outside the scope of the payment-system intervention this study evaluated.

CONCLUSION

This study concludes that significant difference exists in the efficiency of digital and cash payment systems among coffee shops within the IPB Vocational School campus area; the digital payment system is perceived as more efficient and superior in the dimensions of speed, accuracy, and reliability, whereas the cash system holds an advantage solely in the dimension of operational cost. Digital payment implementation exerts a

significant positive effect on cash flow smoothness, whereas cash payment's effect, though positive in direction, is not statistically significant That indicates the two payment systems play distinct rather than equivalent roles in shaping coffee shops' financial operations. A meaningful portion of the variation in cash flow smoothness remains unexplained by payment system alone, suggesting that other operational factors not modeled in this study also contribute.

This study contributes a direct, quantitative comparison of digital and cash payment efficiency within a single operational cost. Addressing a gap left open by prior research, which has largely evaluated digital adoption in isolation and relied on qualitative rather than quantitative measurement.

This study is limited by its focus on a single, student-dominated campus context and its restriction to two payment-system variables, leaving other potential drivers of cash flow smoothness unexamined.

Future research is recommended to extend this comparative approach to coffee shops serving non-student consumer bases and to incorporate moderating variables such as daily transaction volume or duration of operation, in order to account for the variation in cash flow left.

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