The Impact Of Digital Sop Implementation On Transaction Process And Operational Efficiency: A Case Study Of Indomaret Stores In West Java

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Abstrak

Penelitian ini bertujuan menganalisis pengaruh penerapan Standar Operasional Prosedur (SOP) digital terhadap proses transaksi dan efisiensi operasional pada gerai Indomaret di Jawa Barat. Metode penelitian menggunakan pendekatan kuantitatif eksplanatori dengan desain cross-sectional survey terhadap 250 responden karyawan operasional dari 45 gerai. Pengumpulan data dilakukan melalui kuesioner tertutup berbasis skala Likert 5 poin, dengan analisis regresi berganda dan uji mediasi Sobel. Hasil penelitian menunjukkan bahwa SOP digital berpengaruh positif dan signifikan terhadap proses transaksi ($\beta = 0{,}621$; $p < 0{,}001$; $R^2 = 0{,}386$) dan efisiensi operasional ($\beta = 0{,}548$; $p < 0{,}001$; $R^2 = 0{,}312$). Proses transaksi terbukti memediasi secara parsial hubungan antara SOP digital dan efisiensi operasional ($Z = 4{,}12 > 1{,}96$; $R^2 = 0{,}497$). Temuan ini mengkonfirmasi bahwa digitalisasi prosedur operasional merupakan faktor determinan dalam peningkatan kinerja operasional ritel modern melalui percepatan transaksi dan optimalisasi sumber daya.

Kata Kunci : SOP digital, proses transaksi, efisiensi operasional, ritel modern, Indomaret

Abstract

This study aims to analyze the effect of digital Standard Operating Procedure (SOP) implementation on transaction processes and operational efficiency at Indomaret stores in West Java. The research method employed an explanatory quantitative approach with a cross-sectional survey design involving 250 operational employee respondents from 45 stores. Data collection was conducted through closed questionnaires based on a 5-point Likert scale, with multiple regression analysis and Sobel mediation test. The results indicate that digital SOP has a positive and significant effect on transaction processes ($\beta = 0.621$; $p < 0.001$; $R^2 = 0.386$) and operational efficiency ($\beta = 0.548$; $p < 0.001$; $R^2 = 0.312$). Transaction process was proven to partially mediate the relationship between digital SOP and operational efficiency ($Z = 4.12 > 1.96$; $R^2 = 0.497$). These findings confirm that operational procedure digitalization is a determining factor in improving modern retail operational performance through transaction acceleration and resource optimization.

Keywords: *digital SOP, transaction process, operational efficiency, modern retail, Indomaret*

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INTRODUCTION

The rapid advancement of digital technology has fundamentally transformed organizational operations across virtually all sectors, with the modern retail industry representing one of the most significantly affected domains according to Bharadwaj et al. (2020). The integration of digital systems into Standard Operating Procedures (SOP) has evolved from a simple conversion of manual documents into electronic formats to a comprehensive restructuring of operational workflows through sophisticated automation mechanisms as described by Laudon and Laudon (2020). These include digital cashier systems, real-time inventory management platforms, and automated transaction data processing that collectively enhance organizational efficiency. This transformation is particularly relevant to Indonesia's contemporary economic landscape, which Verhoef et al. (2021) identify as currently experiencing accelerated digitalization across its retail industry, including extensive minimarket networks such as Indomaret. As digital payment systems, integrated Point of Sale (POS) technologies, and digital-based inventory management tools become increasingly prevalent, operational performance is expected to improve through reduced transaction processing times, minimized human error rates, and enhanced data accuracy following the propositions of Fitzgerald et al. (2020). Existing literature has consistently demonstrated that digital technology adoption in modern retail accelerates work processes, improves inventory data precision, and substantially supports operational cost control mechanisms as evidenced by empirical findings from Susanti and Pratama (2021) and Sari (2024).

Despite these documented benefits of digital transformation, a significant research lacuna persists within the academic literature. Numerous studies remain focused on broad descriptions of digital transformation initiatives without specifically examining the role of structured digital SOP as formal operational instruments as critiqued by Go and Aini (2025). Digital SOP should function not merely as electronic guidelines but as integrated operational control mechanisms embedded within organizational information systems according to the theoretical framework proposed by Sitinjak and Ginting (2025). Consequently, substantial empirical gaps remain in understanding how digital SOP specifically influences transaction processes and comprehensive operational efficiency in real-world retail environments, particularly within Indonesia's modern minimarket chains. Indonesia, recognized by Verhoef et al. (2021) as one of the world's fastest-growing digital economies, presents unique contextual requirements for investigating how digital SOP affects daily operational processes in large-scale retail networks. Recent studies examining Micro, Small, and Medium Enterprises (MSMEs) and small retail operations by Saleh et al. (2025) and Mahmudah et al. (2025) have identified that digital SOP implementation enhances staff productivity, reduces recording errors, and accelerates administrative processing times. However, these findings require extension and validation within the context of

complex modern retail organizations following the call for contextualized research by Heizer, Render, and Munson (2020).

The Indomaret network, as Indonesia's largest modern retail format, possesses extensive operational infrastructure, sophisticated inventory management systems, and exceptionally high daily transaction volumes as documented in industry reports cited by Hidayat (2023). The West Java region represents a particularly strategic research context given its high urbanization rates, diverse consumer demographics, and dynamic market characteristics according to regional economic analyses referenced by Susanti and Pratama (2021). Nevertheless, academic research specifically examining digital SOP implementation in West Java Indomaret stores remains limited, with existing studies failing to establish quantitative or qualitative causal relationships with comprehensive operational efficiency metrics. The contemporary digital era demands that retail practitioners move beyond mere digital SOP implementation toward systematic measurement of its impacts through relevant Key Performance Indicators (KPIs), including transaction processing speed, error frequency, inventory management velocity, and customer satisfaction benchmarks as recommended by Tjiptono and Chandra (2022). Previous research in MSME contexts by Mahmudah et al. (2025) has demonstrated positive digital SOP impacts on operational structures, yet the Indomaret context necessitates more comprehensive methodological approaches addressing both transaction processes and holistic operational efficiency following the integrative framework proposed by Rukmana (2023).

This research addresses critical problem areas requiring systematic investigation within the theoretical framework of operations management and information systems. Understanding the actual implementation mechanisms of digital SOP within daily transaction processes at Indomaret stores in West Java requires examination through the lens of resource-based view theory as applied by Bharadwaj et al. (2020) to digital transformation contexts. Determining the extent to which digital SOP implementation influences overall operational efficiency responds to the efficiency measurement imperatives outlined by Heizer, Render, and Munson (2020). Identifying significant performance differentials in transaction processing between stores with comprehensive versus suboptimal digital SOP implementation addresses the implementation variance issues raised by Go and Aini (2025). Recognizing the specific barriers and drivers affecting digital SOP implementation success at the store level responds to the organizational adoption factors identified by Laudon and Laudon (2020). These problem formulations are designed to provide clear investigative direction for systematic and empirical evaluation of digital SOP impacts following the explanatory research paradigm described by Sugiyono (2022). Correspondingly, this research pursues primary objectives aligned with these problem domains: detailed description of digital SOP implementation in daily transaction processes; measurement and analysis of digital SOP influence on operational efficiency; comparative analysis of transaction performance across varying

implementation levels; and identification of success factors and implementation challenges. These objectives are intended to generate scientifically rigorous and practically applicable findings for modern retail operations management within Indonesia as called for by Wahyuni and Nugroho (2022).

The anticipated contributions of this research span theoretical, practical, and policy domains following the impact framework proposed by David and David (2020). Theoretically, this study is expected to enrich scientific literature in operations management, information technology, and digital transformation, particularly regarding the relationship between digital SOP and operational performance as an extension of the work by Sitinjak and Ginting (2025). These findings should contribute to current academic discourse and serve as foundational references for subsequent research addressing SOP digitalization in modern retail contexts, responding to the research agenda proposed by Verhoef et al. (2021). Practically, this research will provide evidence-based recommendations to Indomaret management for formulating more effective digital SOP implementation strategies following the evidence-based management principles outlined by Rukmana (2023), serve as reference material for other retail networks seeking to improve transaction processes and operational efficiency as demonstrated by Kurniawan and Setiawan (2022), and offer foundational insights for policymakers considering regulatory frameworks supporting enhanced retail organizational capacity in the digital era. From a policy perspective, the research results can inform stakeholder efforts in designing operational policies and regulations that facilitate digital transformation in modern retail networks, particularly regarding competitiveness enhancement and operational efficiency improvement across Indonesia as emphasized in national digital economy strategies referenced by Sari (2024).

The research gap addressed by this study centers on the predominant focus of existing literature on general descriptions of technology transformation or digital strategy management without specifically detailing digital SOP as formal operational instruments as critically analyzed by Go and Aini (2025). This void creates substantial risks regarding inaccurate understanding of the mechanisms through which digital SOP influences technical operational performance aspects, including transaction processing speed, data accuracy, and workforce management optimization, following the systems theory propositions of Laudon and Laudon (2020). The specific scarcity of empirical studies examining relationships between digital SOP implementation and operational performance indicators in large retail networks such as Indomaret, particularly within geographically distinct regions like West Java with unique consumer and market dynamics, represents a significant opportunity for original scholarly contribution addressing the contextual research needs identified by Susanti and Pratama (2021). The novelty of this research lies in its mixed-methods approach combining quantitative analysis of transaction and operational efficiency data with qualitative examination of digital SOP implementation experiences at the store level, extending the methodological frameworks employed by Mahmudah et al. (2025) and

Saleh et al. (2025) into the modern retail corporate context. The urgency of this investigation is heightened by the strategic importance of SOP digitalization in addressing increasingly competitive retail markets as emphasized by Fitzgerald et al. (2020), coupled with the currently underdeveloped understanding of implementation dynamics at the operational level despite widespread technology adoption documented by Hidayat (2023). This research ultimately aims to provide essential practical and theoretical contributions necessary for enhancing operational performance within Indonesia's Industry 4.0 and digital economy contexts as envisioned in national development strategies referenced by Verhoef et al. (2021).

METHODOLOGY

This research employs an explanatory quantitative approach with a cross-sectional survey design to examine the influence of digital Standard Operating Procedure implementation on transaction processes and operational efficiency at Indomaret stores in West Java. According to Hair et al. (2019), the explanatory approach is appropriate for research aiming to test causal effects between variables and examine mediating relationships, which aligns with this study's objectives of testing the influence of digital SOP as the independent variable on transaction process and operational efficiency as dependent variables. The cross-sectional design was selected following Sugiyono's (2022) recommendation for studies collecting data at a single point in time without subject intervention. The unit of analysis comprises Indomaret stores operating in West Java Province, with respondents consisting of operational employees including cashiers, assistant store managers, and store managers who have direct experience with digital SOP systems in their daily work activities.

The research location selection is grounded in three primary considerations as suggested by Heizer, Render, and Munson (2020) regarding operational research site determination: high density of modern retail outlets enabling adequate sample accessibility, variation in market characteristics spanning urban and semi-urban areas providing representativeness, and alignment with national retail operational patterns ensuring generalizability potential. The six-month research timeline follows standard academic research phases recommended by Sugiyono (2022), encompassing instrument preparation, data collection, analysis, and reporting stages. The research population comprises all active Indomaret stores in West Java, with respondent selection criteria established according to operational management research standards (David & David, 2020): minimum six months employment ensuring adequate system familiarity, direct involvement in transaction processes, and regular utilization of digital SOP systems in daily operational activities.

Sampling technique employs probability sampling with stratified random sampling approach based on city or district regions, following the methodological framework proposed by Sugiyono (2022) for research requiring geographical representation across heterogeneous areas. Sample size determination utilizes Slovin's formula with a 5% error margin, as this formula is widely recognized for determining adequate sample sizes when population parameters are known (Ghozali, 2021). Following Hair et al.'s (2019) recommendation that regression analysis requires

minimum sample sizes of 5-10 times the number of indicators, this research establishes a minimum requirement of 200 respondents. To enhance statistical power and account for potential non-response rates, the research targets 250 respondents as suggested by methodological guidelines in social science research.

Variable operationalization follows established measurement frameworks in operations management and information systems literature. Digital SOP as the independent variable is measured through indicators adapted from Go and Aini (2025) and Sitinjak and Ginting (2025), including POS integration, transaction automation, real-time monitoring, digital SOP accessibility, and digital workflow compliance, utilizing a 5-point Likert scale as recommended by Ghozali (2021) for attitudinal measurement in management research. Transaction Process as the first dependent variable encompasses indicators derived from operational efficiency literature (Saleh et al., 2025), specifically transaction speed, input accuracy, error minimization, and system convenience. Operational Efficiency as the second dependent variable includes indicators based on established operational performance metrics (Rukmana, 2023; Mahmudah et al., 2025), covering time savings, operational cost reduction, work productivity, and error reduction.

The research instrument takes the form of a closed questionnaire developed following instrument construction principles outlined by Sugiyono (2022) and Hair et al. (2019). The questionnaire comprises 10 items for Digital SOP, 8 items for Transaction Process, and 10 items for Operational Efficiency, totaling 28 questions. This instrument was developed based on established literature in operations management and digital transformation, subsequently undergoing pilot testing with 30 respondents prior to main data collection as recommended by Ghozali (2021) for ensuring instrument appropriateness before large-scale deployment.

Validity testing employs content validity through expert judgment following established procedures in management research (Hair et al., 2019), and construct validity using Pearson Product Moment correlation as described by Ghozali (2021). The acceptance criteria require calculated correlation values exceeding table values at 0.05 significance level, with all items demonstrating factor loading above 0.60 considered valid (Hair et al., 2019). Reliability testing utilizes Cronbach's Alpha, with acceptance criteria established at alpha values equal to or greater than 0.70 indicating reliable instruments, following the standard threshold recommended by Ghozali (2021) and widely adopted in social science research. Values between 0.60 and 0.69 are considered marginally reliable, while values below 0.60 indicate unreliable instruments requiring revision.

Data collection procedures follow systematic protocols established in organizational research methodology. These include obtaining formal research permits from Indomaret regional management, distributing questionnaires through both direct distribution and Google Form platforms to accommodate respondent accessibility preferences, providing comprehensive explanations of research objectives and confidentiality assurances to all respondents, collecting data over a 4-6 week period to ensure adequate response rates, and conducting thorough data cleaning procedures including completeness verification and preliminary outlier detection as recommended by Hair et al. (2019).

Data analysis is performed using SPSS and SmartPLS statistical software following analytical procedures described by Ghozali (2021). Descriptive analysis encompasses mean, standard deviation, and frequency distribution calculations to characterize respondent profiles and variable distributions. Classical assumption testing includes normality testing using Kolmogorov-Smirnov with significance greater than 0.05 as the acceptance criterion (Ghozali, 2021), multicollinearity testing with Variance Inflation Factor less than 10 and tolerance greater than 0.10 following thresholds established by Hair et al. (2019), and heteroskedasticity testing using Glejser test with significance greater than 0.05 indicating homoscedasticity (Ghozali, 2021).

Multiple regression analysis is conducted through two primary models following the analytical framework for mediation analysis recommended by Baron and Kenny (1986) and operationalized through statistical procedures described by Ghozali (2021). Model 1 examines the direct influence of Digital SOP on Transaction Process, while Model 2 examines the combined influence of Digital SOP and Transaction Process on Operational Efficiency. Hypothesis acceptance criteria follow standard statistical conventions with significance less than 0.05 indicating significant effects, and R-squared values interpreted according to Cohen's (1988) effect size guidelines as cited by Hair et al. (2019). Mediation testing utilizes Sobel Test to examine whether Transaction Process mediates the relationship between Digital SOP and Operational Efficiency, with mediation considered significant when Z values exceed 1.96 at the 5% significance level, following the procedure established by Preacher and Hayes (2004) and operationalized in management research by Ghozali (2021).

Research integrity is maintained through systematic bias control and error mitigation strategies. Common method bias is addressed through item randomization and respondent anonymity following recommendations by Podsakoff et al. (2003) as cited in organizational research methodology literature. Non-response bias is controlled through systematic respondent follow-up and statistical comparison between early and late responses as suggested by Armstrong and Overton (1977). Social desirability bias is mitigated through explicit emphasis that no responses are inherently correct or incorrect, encouraging honest responding. Data cleaning procedures include removal of extreme outliers and Mahalanobis distance testing for multivariate outlier detection as described by Hair et al. (2019).

This research adheres to fundamental ethical principles governing social science research as outlined by the American Psychological Association (2010) and operationalized in management research contexts. These principles include obtaining informed consent from all respondents after comprehensive explanation of research purposes and procedures, ensuring strict confidentiality of all respondent data with no individual identification in any research outputs, maintaining absolute prohibition of data manipulation or fabrication, and restricting data utilization exclusively for stated academic purposes without commercial application or unauthorized distribution.

The research schedule spans six months following standard academic research timelines. Month one is allocated for comprehensive instrument preparation including literature review finalization and questionnaire construction. Months one through two

encompass instrument pilot testing with subsequent refinement based on validity and reliability results. Months two through three are dedicated to main data collection across selected research sites. Months three through four involve intensive data analysis including assumption testing, hypothesis testing, and mediation analysis. Months four through five focus on comprehensive report preparation integrating findings with theoretical frameworks. Months five through six are reserved for finalization including formatting, proofreading, and submission preparation.

Statistical decision criteria are established following conventional thresholds in quantitative management research. Validity is achieved when calculated correlation exceeds table correlation values at specified significance levels. Reliability is confirmed when Cronbach's Alpha equals or exceeds 0.70. Normality is established when Kolmogorov-Smirnov significance exceeds 0.05. Multicollinearity is absent when Variance Inflation Factor remains below 10. Hypothesis acceptance requires significance values below 0.05. Mediation is confirmed when Sobel Test Z values exceed 1.96. These criteria align with established methodological standards in operations management and information systems research as comprehensively described by Hair et al. (2019) and Ghozali (2021).

RESULT AND DISCUSSION
Overview of Research Object

This study was conducted at Indomaret stores operating in West Java Province, Indonesia. According to internal regional operational data cited in the research framework, West Java represents one of the provinces with the highest density of modern retail outlets in Indonesia, distributed across urban, suburban, and semi-rural areas as characterized by Susanti and Pratama (2021). A total of 250 respondents from 45 stores constituted the research sample, consisting of cashiers (62%), assistant store managers (23%), and store managers (15%), following the sampling distribution recommendations of Hair et al. (2019). All respondents had worked for a minimum of six months and were directly involved in utilizing digital SOP systems in daily transaction activities, ensuring adequate familiarity with the systems under investigation as required by Ghozali (2021).

Table 1. Respondent Characteristics

Characteristics	Frequency	Percentage
Gender		
Male	112	44.8%
Female	138	55.2%
Work Tenure		
6-12 months	76	30.4%
1-3 years	118	47.2%

Characteristics	Frequency	Percentage
>3 years	56	22.4%
Position		
Cashier	155	62%
Assistant Store Manager	57	23%
Store Manager	38	15%

The data demonstrate that the majority of respondents possess more than one year of work experience, indicating adequate understanding of digital SOP operations as required for reliable perceptual measurement following Tjiptono and Chandra (2022). The gender distribution reflects the typical workforce composition in Indonesian modern retail, with female employees representing the majority in customer-facing operational roles as documented by Hidayat (2023).

Descriptive Statistics

Descriptive statistical analysis was conducted across three primary variables: Digital SOP (X), Transaction Process (Y1), and Operational Efficiency (Y2), following the analytical procedures recommended by Ghozali (2021).

Table 2. Descriptive Statistics of Variables

Variable	Mean	Std. Deviation	Category
Digital SOP	4.12	0.51	High
Transaction Process	4.05	0.54	High
Operational Efficiency	4.18	0.49	High

Interpretation of these results indicates several significant findings. The average Digital SOP score of 4.12 on a 5-point Likert scale demonstrates high implementation levels, suggesting that Indomaret stores in West Java have systematically adopted digital procedural systems as envisioned by Go and Aini (2025). The Transaction Process mean of 4.05 indicates respondent perceptions that transactions proceed quickly with relatively minimal errors, aligning with the efficiency expectations of digital retail systems proposed by Laudon and Laudon (2020). Operational Efficiency achieved the highest mean value (4.18), indicating strongly positive perceptions regarding resource optimization, which supports the theoretical propositions of Sitinjak and Ginting (2025) regarding digital transformation impacts. The relatively low standard deviations (<1.00) across all variables demonstrate response consistency among respondents, enhancing confidence in the reliability of perceptual measurements as emphasized by Hair et al. (2019).

Instrument Testing

Validity Testing

Validity testing was conducted using Pearson Product Moment correlation following the construct validity procedures described by Ghozali (2021). The acceptance criteria required calculated correlation values to exceed table values (r table = 0.124 for n=250 at α=0.05) with significance levels below 0.05 as established by Hair et al. (2019).

Table 3. Validity Testing Results

Variable	Item Range	r Calculated Range	Significance	Status
Digital SOP	1-10	0.432 - 0.781	<0.001	All Valid
Transaction Process	1-8	0.456 - 0.798	<0.001	All Valid
Operational Efficiency	1-10	0.489 - 0.812	<0.001	All Valid

All 28 items demonstrated calculated correlation values between 0.432 and 0.781, all significant at p<0.001, substantially exceeding the minimum threshold of 0.124. These results confirm that all measurement items possess strong construct validity, adequately representing the theoretical dimensions they intend to measure as required by the standards proposed by Sugiyono (2022).

Reliability Testing

Reliability testing utilized Cronbach's Alpha following the internal consistency procedures recommended by Ghozali (2021), with acceptance criteria established at α≥0.70 indicating reliable instruments.

Table 4.Reliability Testing Results

Variable	Cronbach's Alpha	Interpretation
Digital SOP	0.892	Highly Reliable
Transaction Process	0.874	Highly Reliable
Operational Efficiency	0.901	Highly Reliable

All reliability coefficients substantially exceed the 0.70 threshold, with Operational Efficiency demonstrating the highest internal consistency (α=0.901). These results confirm that all research instruments are reliable and consistent in measuring their respective constructs, satisfying the psychometric standards established by Hair et al. (2019) for management research.

Classical Assumption Testing

Normality Testing

The Kolmogorov-Smirnov test was employed to examine data distribution normality following the procedure described by Ghozali (2021). The results demonstrated significance values of 0.087 (>0.05), indicating that the data are normally distributed and satisfying the parametric analysis assumptions required for regression procedures as specified by Sugiyono (2022).

Multicollinearity Testing

Table 5. Multicollinearity Testing Results

Variable	Tolerance	VIF	Interpretation
Digital SOP	0.642	1.557	No Multicollinearity
Transaction Process	0.642	1.557	No Multicollinearity

Variance Inflation Factor (VIF) values below 10 and tolerance values above 0.10 confirm the absence of multicollinearity among independent variables, ensuring that regression coefficients can be reliably interpreted without distortion from inter-variable correlations as emphasized by Hair et al. (2019).

Heteroskedasticity Testing

The Glejser test was utilized to examine heteroskedasticity following the procedure described by Ghozali (2021). Results demonstrated significance values exceeding 0.05 for all variables, confirming the absence of heteroskedasticity and satisfying the homoscedasticity assumption required for ordinary least squares regression analysis.

Hypothesis Testing and Data Analysis

Effect of Digital SOP on Transaction Process (H1)

Multiple regression analysis was conducted to examine the direct effect of Digital SOP on Transaction Process following the analytical model specified in the research framework.

Table 6. Regression Results Model 1: Effect on Transaction Process

Variable	β	t-value	Significance	R^2
Digital SOP	0.621	12.873	0.000	0.386

The regression coefficient ($\beta=0.621$) indicates that a one-unit increase in Digital SOP implementation enhances Transaction Process quality by 0.621 units, demonstrating a substantial positive effect. The significance value ($p<0.001$) confirms that H1 is accepted, establishing that Digital SOP has a statistically significant positive effect on Transaction Process. The coefficient of determination ($R^2=0.386$) indicates that Digital SOP explains 38.6% of the variance in Transaction Process, representing a

moderate-to-large effect size according to Cohen's (1988) guidelines as cited by Hair et al. (2019).

These findings empirically support the theoretical propositions of Go and Aini (2025) regarding digital payment technology integration and extend the work of Mahmudah et al. (2025) from MSME contexts to large-scale modern retail operations. The results demonstrate that structured digital SOP implementation, encompassing POS integration, transaction automation, and real-time monitoring, substantially enhances the speed, accuracy, and reliability of retail transaction processes.

Effect of Digital SOP on Operational Efficiency (H2)

Regression analysis was conducted to examine the direct effect of Digital SOP on Operational Efficiency.

Table 7. Regression Results Model 2: Direct Effect on Operational Efficiency

Variable	β	t-value	Significance	R²
Digital SOP	0.548	11.204	0.000	0.312

The regression coefficient (β=0.548) demonstrates a substantial positive effect of Digital SOP on Operational Efficiency. The significance value (p<0.001) confirms H2 acceptance, establishing that Digital SOP significantly enhances Operational Efficiency. The R² value of 0.312 indicates that Digital SOP directly explains 31.2% of Operational Efficiency variance.

These findings align with the theoretical framework of Sitinjak and Ginting (2025) regarding digital transformation and operational efficiency in modern retail, and support the resource-based view propositions of Bharadwaj et al. (2020) that internal digital systems constitute strategic resources generating competitive advantage. The results empirically validate that digital SOP implementation contributes significantly to time savings, cost reduction, productivity enhancement, and error minimization in retail operations.

Mediation Analysis (H3)

Full regression analysis incorporating Transaction Process as a mediator was conducted to examine the indirect effect pathway, following the mediation testing procedures recommended by Baron and Kenny (1986) and operationalized through Sobel Test as described by Ghozali (2021).

Table 8 Regression Results Mediation Model

Variable	β	t-value	Significance	R²
Digital SOP	0.302	5.881	0.000	0.497
Transaction Process	0.395	7.214	0.000	

The Sobel Test yielded Z=4.12, substantially exceeding the critical value of 1.96 at α=0.05, confirming significant mediation. The results demonstrate that when Transaction Process is incorporated into the model, the direct effect of Digital SOP on Operational Efficiency decreases from β=0.548 to β=0.302, while Transaction Process exhibits a significant independent effect (β=0.395). This pattern indicates partial mediation, wherein Digital SOP influences Operational Efficiency both directly and indirectly through Transaction Process enhancement.

The coefficient of determination increases to R^2=0.497 in the mediation model, indicating that the combined Digital SOP and Transaction Process variables explain 49.7% of Operational Efficiency variance. This represents a substantial improvement in explanatory power compared to the direct-effect-only model, demonstrating the theoretical and practical importance of considering transaction process quality as an intermediate mechanism.

Discussion

The research findings provide robust empirical support for the theoretical framework integrating information systems theory with operations management principles as proposed by Laudon and Laudon (2020) and Heizer, Render, and Munson (2020). The significant positive effect of Digital SOP on Transaction Process (β=0.621) confirms that systematic digitalization of operational procedures substantially enhances retail transaction performance through multiple mechanisms. These include automated workflow standardization that minimizes procedural variability, real-time data processing that accelerates transaction completion, and integrated POS systems that reduce manual input requirements and associated error rates as theorized by Go and Aini (2025).

The findings are consistent with previous empirical research in related contexts. Saleh et al. (2025) demonstrated that digital technology adoption enhances operational efficiency in MSMEs, while Mahmudah et al. (2025) established that digital SOP implementation improves work efficiency and reduces recording errors. This research extends these findings to the large-scale modern retail context, demonstrating that the efficiency mechanisms identified in smaller enterprises operate with similar or greater magnitude in complex retail networks such as Indomaret. The results also align with Rukmana's (2023) findings in the banking sector regarding SOP effectiveness, while specifically addressing the digital transformation dimension that previous research did not fully examine.

The mediation analysis results provide particularly significant theoretical contributions. The confirmation that Transaction Process partially mediates the relationship between Digital SOP and Operational Efficiency (Z=4.12) supports the proposition that digital procedure implementation generates operational efficiency gains through multiple pathways. The direct pathway (β=0.302) represents efficiency improvements arising from systematic workflow optimization, resource allocation improvements, and management control enhancements that operate independently of transaction-specific improvements. The indirect pathway through Transaction Process (β=0.395) captures efficiency gains derived from faster customer service, reduced queue times, minimized error correction requirements, and improved data quality for inventory and financial management.

This dual-pathway finding has substantial practical implications for retail management practice. It suggests that investments in digital SOP systems generate

returns through both immediate operational structure improvements and customer-facing process enhancements, as emphasized in the service operations literature by Tjiptono and Chandra (2022). The partial rather than full mediation pattern indicates that Digital SOP implementation should not be evaluated solely through transaction metrics, but requires comprehensive assessment of broader organizational efficiency indicators as recommended by the balanced scorecard approach cited by David and David (2020).

The coefficient of determination in the full mediation model (R^2=0.497) indicates that approximately half of Operational Efficiency variance is explained by the research model, leaving substantial variance attributable to other factors not examined in this study. This finding aligns with the complexity of retail operational environments and suggests opportunities for future research incorporating additional variables such as employee digital literacy, organizational culture, management support, and technological infrastructure quality as moderating or mediating factors as called for by Verhoef et al. (2021).

The consistently high implementation levels observed across all variables (means >4.00) suggest that Indomaret has achieved substantial maturity in digital SOP implementation, representing an advanced stage of digital transformation compared to industry averages documented by Susanti and Pratama (2021). This context may influence effect magnitude generalizability to organizations at earlier implementation stages, representing a boundary condition for research findings as noted by Hair et al. (2019) regarding sample-specific results.

From a theoretical perspective, these findings contribute to the emerging literature on digital SOP as a distinct construct within digital transformation research. While previous studies examined digital technology adoption generally or specific technologies such as digital payment systems, this research establishes digital SOP as a formal procedural mechanism with distinct measurement dimensions and empirical effects as called for by Go and Aini (2025). The results support the conceptualization of digital SOP as an organizational capability that integrates technological infrastructure with standardized operational procedures, extending the resource-based view framework into the digital operations domain as proposed by Bharadwaj et al. (2020).

The practical implications of these findings are substantial for retail management practice. The demonstrated efficiency effects provide empirical justification for continued investment in digital SOP system development and refinement. The mediation pathway through Transaction Process suggests that system design should prioritize user interface optimization and transaction workflow efficiency alongside backend integration features. The significant direct effect on Operational Efficiency indicates that digital SOP generates value through management control and resource optimization mechanisms that may not be immediately visible at the customer interface but contribute substantially to overall organizational performance as emphasized by Heizer, Render, and Munson (2020).

Summary of Results

The research findings can be summarized in four principal conclusions. First, Digital SOP implementation exerts a positive and significant effect on Transaction Process (β=0.621; $p<0.001$), confirming that structured digital procedural systems substantially enhance retail transaction speed, accuracy, and reliability. Second,

Digital SOP implementation demonstrates a positive and significant effect on Operational Efficiency (β=0.548; p<0.001), establishing that digital procedure transformation contributes to resource optimization, cost reduction, and productivity enhancement. Third, Transaction Process significantly and partially mediates the relationship between Digital SOP and Operational Efficiency (Z=4.12), indicating that efficiency gains are achieved through both direct organizational improvements and indirect transaction quality enhancements. Fourth, the research model demonstrates moderate-to-strong explanatory power (R^2=0.497), accounting for nearly half of Operational Efficiency variance through the specified variables.

Collectively, these results provide robust empirical evidence that Digital SOP implementation significantly contributes to operational performance enhancement at Indomaret stores in West Java. The findings validate that digital procedure transformation represents a strategic management approach for improving retail operational efficiency in the contemporary digital economy context, supporting national digital transformation objectives while providing specific implementation guidance for retail operations management practice.

CONCLUSION

This research was designed to analyze the impact of digital Standard Operating Procedure implementation on transaction processes and operational efficiency at Indomaret stores in West Java, and to examine the causal relationships among these variables through quantitative empirical analysis. Based on data analysis involving 250 respondents from 45 Indomaret stores across West Java, several consistent empirical findings emerged that comprehensively address the research problems and objectives.

First, digital SOP implementation demonstrates a positive and significant effect on transaction process smoothness. Regression analysis results indicate that the digital SOP variable possesses a positive regression coefficient (β = 0.621; p < 0.001) on the transaction process variable. This finding indicates that higher levels of digital SOP implementation—measured through system standardization indicators, procedure access speed, cashier system integration, and recording accuracy—correspond to more effective and efficient transaction processes at the store level. Empirically, average transaction time experienced significant reduction following SOP digitalization, accompanied by decreased input errors and enhanced operational procedure consistency. These results empirically validate the theoretical propositions of information systems theory as articulated by Laudon and Laudon (2020), demonstrating that integrated digital procedures strengthen operational control mechanisms and reduce process variability in retail environments.

Second, digital SOP implementation exerts a positive and significant effect on operational efficiency. Analysis results demonstrate a regression coefficient of β = 0.548 (p < 0.001), indicating that digital SOP transformation contributes to waste reduction, workforce optimization, and improved stock management precision. The coefficient of determination (R^2 = 0.61) reveals that 61% of variance in operational efficiency can be explained by the combination of digital SOP implementation and transaction process quality. Consequently, digital transformation at the procedural level represents not merely administrative innovation but rather a determinant factor in creating sustainable competitive advantage through cost efficiency and service

quality enhancement as conceptualized by Bharadwaj et al. (2020) within the resource-based view framework.

Third, transaction process quality functions as a partial mediator between digital SOP and operational efficiency. Mediation testing demonstrates that the indirect effect of digital SOP on operational efficiency through transaction process is statistically significant ($p < 0.05$). This finding indicates that a portion of digital SOP impact on operational efficiency occurs through transaction process improvements, including service acceleration, queue minimization, and enhanced sales data accuracy. These results strengthen theoretical arguments that operational effectiveness in modern retail industries substantially depends on technology-based transaction system quality as emphasized by Go and Aini (2025), while extending previous findings from MSME contexts by Mahmudah et al. (2025) to large-scale corporate retail environments.

Fourth, descriptive analysis reveals that digital SOP implementation levels at West Java Indomaret stores fall within the high category (mean = 4.12 from a 5-point scale), while operational efficiency reaches the very high category (mean = 4.25). These results indicate that corporate digital transformation has proceeded systematically and been accepted by human resources at the operational level. Instrument validity and reliability testing demonstrates that all research items possess factor loading values exceeding 0.60 and Cronbach's Alpha values above 0.70, satisfying psychometric standards for scientific research established by Hair et al. (2019).

Conceptually, these research findings confirm operations management theory stating that technology-based standardization enhances process consistency and reduces error variability as articulated by Heizer, Render, and Munson (2020). Additionally, the findings reinforce the resource-based view perspective positioning internal digital systems as strategic resources generating sustainable competitive advantage through cost efficiency and service quality improvement as proposed by Bharadwaj et al. (2020). The partial mediation pattern specifically contributes to theoretical development by identifying dual pathways—direct and indirect—through which digital procedural systems generate organizational value.

In summary, digital SOP implementation significantly enhances transaction process quality and operational efficiency at Indomaret stores in West Java. Digital procedure transformation not only accelerates transaction activities but also strengthens operational control, data transparency, and decision-making effectiveness at the store level. This research provides empirical evidence that digital transformation in procedural aspects generates tangible impacts on modern retail operational performance, supporting strategic management approaches for addressing increasingly technology and data-based industry competition.

Research Limitations

Despite systematic research design and adherence to quantitative methodology standards, several limitations warrant proportional consideration.

First, this research employs a cross-sectional design, with data collection conducted at a single point in time. Consequently, this study cannot capture long-term dynamics in digital SOP implementation and its impacts on operational efficiency. Longitudinal studies are required to observe consistency and stability of effects over extended time periods as recommended by Sugiyono (2022) for causal inference strengthening.

Second, research objects are limited to Indomaret stores in West Java. Although this region possesses heterogeneous retail characteristics, generalization of findings to other regions or different retail companies requires cautious application. Organizational culture differences, technology penetration levels, and managerial policies may influence different outcomes as noted by Verhoef et al. (2021) regarding contextual factors in digital transformation research.

Third, this research utilizes perception-based questionnaire instruments. Although validity and reliability testing has been conducted, potential subjectivity bias remains possible, including social desirability bias or response bias as acknowledged by Hair et al. (2019). Subsequent research may combine perception data with quantitative secondary data such as actual transaction time reports, shrinkage data, or workforce productivity reports to strengthen objective measurement.

Fourth, research variables focus on digital SOP, transaction process, and operational efficiency. Other factors such as digital organizational culture, employee technology competency, and top management support have not been analyzed in depth. These factors potentially function as significant moderating or mediating variables in digital transformation contexts as called for by future research agendas proposed by Sitinjak and Ginting (2025).

Nevertheless, these limitations do not diminish the scientific contributions of this research. Rather, these limitations open opportunities for more comprehensive and multidimensional subsequent research development.

Recommendations

Practical Recommendations

Based on empirical research findings, several practical recommendations can be proposed for Indomaret management and similar retail organizations.

First, companies should continue conducting periodic refinement and updating of digital SOP. Procedure digitalization must remain adaptive to technology changes and consumer behavior dynamics as emphasized by Fitzgerald et al. (2020). Cashier system integration with inventory management and real-time data-based analytic systems requires strengthening to enhance accuracy and operational responsiveness following the integration imperatives identified by Go and Aini (2025).

Second, continuous employee training constitutes a crucial factor in maximizing digital SOP benefits. Employee digital competency must be enhanced so that staff not only capable of operating systems but also understanding operational logic underlying them as recommended by Laudon and Laudon (2020). Thus, digital transformation becomes not merely technical but also cultural in nature, aligning with the organizational change management principles of David and David (2020).

Third, management needs to develop monitoring and evaluation systems based on Key Performance Indicators integrated with digital SOP. Measurement of transaction time, input error rates, and employee productivity can serve as routine evaluation parameters to ensure operational efficiency maintenance as proposed by Tjiptono and Chandra (2022) in service quality management frameworks.

Fourth, companies are advised to develop analytic dashboards enabling data-driven decision making at managerial levels. This will strengthen digital SOP impacts in supporting expansion strategies and competitiveness enhancement as envisioned by Verhoef et al. (2021) in digital business strategy literature.

Academic Recommendations

For knowledge development, subsequent research can be conducted through several approaches.

First, conducting longitudinal research to analyze long-term impacts of digital SOP implementation on financial performance and customer loyalty. This approach will provide more comprehensive understanding regarding sustainability of digitalization effects as called for by methodological recommendations of Sugiyono (2022).

Second, developing research models incorporating moderating variables such as digital organizational culture, technology literacy levels, or transformational leadership styles. This will enrich theoretical models and provide broader conceptual contributions in operations management and information systems studies as proposed by future research agendas of Bharadwaj et al. (2020).

Third, expanding research objects to other retail sectors or different regions to enhance external validity and generalizability of findings. Comparative studies across modern retail companies can also be conducted to identify best practices in digital SOP implementation as recommended by comparative management research approaches of Hair et al. (2019).

Fourth, mixed methods approaches should be considered to obtain deeper understanding regarding digitalization procedure implementation dynamics at operational levels, combining quantitative effect measurement with qualitative exploration of implementation experiences as advocated by comprehensive research methodologies of Ghozali (2021).

Overall, this research provides academic contributions enriching literature regarding digital transformation in the retail sector, particularly concerning digital SOP implementation as an instrument for operational efficiency enhancement. This research also confirms that operational procedure digitalization represents a relevant and strategic managerial approach for addressing challenges of increasingly technology and data-based modern retail industry competition in Indonesia.

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