

## **Adoption of Digital Inventory Management Systems and Its Impact on Operational Efficiency in Retail SMEs**

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### **Abstract**

Retail small and medium-sized enterprises increasingly rely on cashier and inventory applications, yet quantitative evidence on how the adoption of these systems translates into operational efficiency remains limited, particularly in eastern Indonesia. This study examined the effect of three dimensions of digital inventory management system adoption, namely extent of use, system integration, and perceived usefulness, on the operational efficiency of retail small and medium-sized enterprises in Kendari City. An explanatory quantitative survey design was employed. Because the population size was unknown, the sample size was determined with the Lemeshow formula, which yielded 96 respondents. Respondents were owners or stock-managing employees of retail enterprises that had used a digital inventory application for at least six months and were selected through purposive sampling. Data were collected with an online questionnaire on a five-point Likert scale and analysed through multiple linear regression after instrument and classical assumption testing. The results show that extent of use, system integration, and perceived usefulness each have a positive and significant effect on operational efficiency, and together they explain 39.7 percent of its variation. Perceived usefulness is the strongest predictor, followed by extent of use and system integration. The findings indicate that efficiency gains depend not merely on owning a digital system but on how intensively it is used, how well it is connected with sales, purchasing, and financial records, and how strongly users value it. Application providers and support programmes should therefore pair adoption with feature training and integration assistance.

**Keywords:** Digital Inventory System; Operational Efficiency; Perceived Usefulness; Retail SMEs; System Integration

### **INTRODUCTION**

Inventory is one of the largest and most sensitive assets of a retail business. For small and medium-sized enterprises (SMEs), poor inventory control quickly turns into stockouts that lose sales, overstock that ties up cash and shelf space, and shrinkage from damaged, expired, or missing goods. Because SMEs operate with limited capital, storage, and managerial capacity, these problems weigh more heavily on them than on large firms

(Panigrahi, Shrivastava & Nudurupati, 2024). Empirical work has also shown that inventory management practices are closely associated with the financial performance of small businesses (Orobia et al., 2020), while a review of two decades of research concluded that technology-supported inventory practices help SMEs reduce inventory costs and improve operational performance (Panigrahi, Shrivastava & Kapur, 2024).

Digital cashier and point-of-sale (POS) applications now make such technology affordable for small retailers. Cloud-based applications widely used in Indonesia, such as Kasir Pintar, Majoo, Moka, Olsera, and Pawoon, combine sales recording with stock tracking, minimum-stock notifications, barcode scanning, and stock reports. At the firm level, digitalisation has been found to improve the financial performance of SMEs (Eller et al., 2020) and the adoption of digital tools has been linked to better financial and sustainability outcomes (Gao et al., 2023). The COVID-19 pandemic accelerated this shift as small businesses turned to digital technologies to keep operating (Papadopoulos, Baltas & Balta, 2020). Nevertheless, adoption among Indonesian micro and small enterprises is uneven and shaped by firm and owner characteristics (Trinugroho et al., 2022), readiness for digital transformation varies considerably (Anatan & Nur, 2023), and SMEs continue to face cost, skill, and infrastructure barriers (Telukdarie et al., 2023).

A growing body of Indonesian research links digital tools to MSME efficiency. Nursasi and Fernanda (2026) found that information technology adoption improves the operational efficiency of SMEs both directly and through inventory control. Ratnanda et al. (2026) reported that QRIS payments and digital financial management significantly improve MSME operational efficiency. Puspitawati, Lhutfi and Qudratov (2024) showed that integrated management accounting information systems enhance inventory efficiency among cafés and restaurants, and a qualitative study in Cirebon found that a digital cashier application made transaction recording and stock management more efficient, although low digital literacy hindered adoption (Islamiati et al., 2025). Studies grounded in the Technology Acceptance Model also show that perceived usefulness drives both the adoption of POS systems (Damayanti et al., 2020) and user satisfaction with them (Pramayasti & Herdinata, 2025).

Three gaps remain in this literature. First, adoption is usually treated either as a yes-or-no decision or as a single construct, so it is unclear which aspect of adoption actually produces efficiency. Second, much of the Indonesian evidence concerns payment and financial recording rather than inventory, or relies on qualitative and community-service designs. Third, retail SMEs outside Java, including those in Kendari City, Southeast Sulawesi, are rarely studied even though their supply chains are longer and stock problems are costly. This study addresses these gaps by decomposing adoption into three measurable dimensions and testing their effects on operational efficiency among retail SMEs in Kendari.

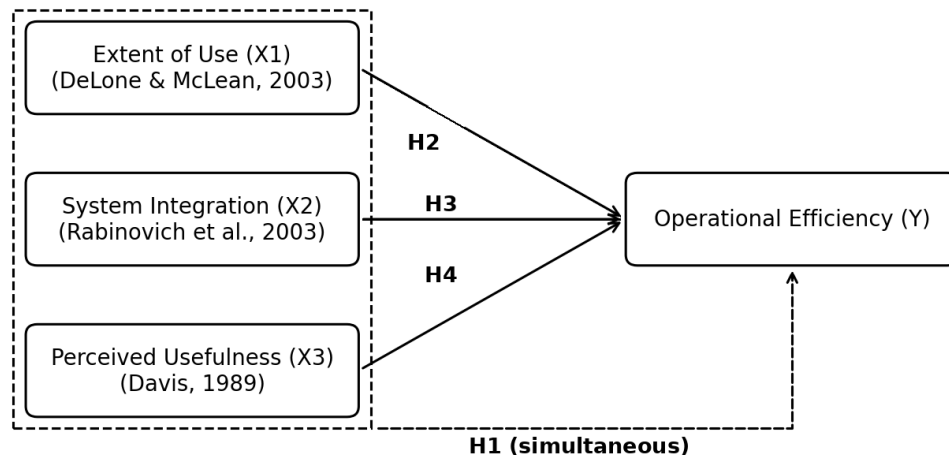
The study as a whole draws on the resource-based view, which holds that valuable resources, when deployed effectively, improve firm performance (Barney, 1991), a perspective recently applied to Indonesian firms by Herdinata et al. (2025). A digital inventory system becomes such a resource only when it is used intensively, integrated with other business processes, and valued by the people who operate it. Accordingly, the first hypothesis is that extent of use, system integration, and perceived usefulness jointly have a

significant effect on the operational efficiency of retail SMEs (H1). The contribution of each dimension is then examined separately.

The first dimension, extent of use, draws on the information systems success model of DeLone and McLean (2003), in which system use is a precondition for net benefits to the organisation. Following Doll and Torkzadeh (1998), use is measured not only by frequency but also by the variety of features employed and the degree to which decisions rely on the system. A retailer that records every stock movement and bases reorder decisions on system data should experience fewer stockouts and less overstock. The second hypothesis is therefore that extent of use has a positive and significant effect on the operational efficiency of retail SMEs (H2).

The second dimension, system integration, refers to the degree to which the inventory application is connected with sales, purchasing, and financial records so that data flow automatically and stock positions are visible in real time. Integration between information systems and operational processes has long been associated with better inventory performance (Rabinovich, Dresner & Evers, 2003), and Puspitawati et al. (2024) found that inventory efficiency suffers when integration is weak. The third hypothesis is that system integration has a positive and significant effect on operational efficiency (H3).

The third dimension, perceived usefulness, comes from the Technology Acceptance Model, which defines it as the degree to which a person believes that using a system enhances job performance (Davis, 1989). Users who perceive the system as useful tend to use it consistently and exploit its features, which should translate into more accurate records and faster stock-taking. The fourth hypothesis is that perceived usefulness has a positive and significant effect on operational efficiency (H4). The conceptual framework is presented in Figure 1.



**Figure 1. Conceptual framework**

Based on this framework, the objective of the study is to examine the partial and simultaneous effects of extent of use, system integration, and perceived usefulness of digital inventory management systems on the operational efficiency of retail SMEs in Kendari City.

## METHOD

This study used an explanatory quantitative approach with a cross-sectional survey design. The population consisted of retail SMEs in Kendari City, such as grocery stores, local minimarkets, clothing stores, and building material stores, that use a digital inventory management system, for example a cashier or POS application with stock features. No official register records how many retailers use such applications, so the population size was unknown. The sample size was therefore determined using the Lemeshow formula (Lemeshow et al., 1990):

$$n = Z^2 \times P(1 - P) / d^2 \quad (1)$$

where  $n$  is the required sample size,  $Z$  is the standard normal value for a 95 percent confidence level (1.96),  $P$  is the unknown population proportion set at 0.5 to obtain the maximum sample, and  $d$  is the margin of error of 10 percent (0.10). Substituting these values gives  $n = (1.96)^2 \times 0.5 \times 0.5 / (0.10)^2 = 96.04$ , which was rounded to 96 respondents.

Respondents were selected by purposive sampling using two criteria: the business had used a digital inventory application for at least six months, so that its effects on operations could be observed, and the respondent was the owner or the employee responsible for stock management. Primary data were collected through a questionnaire distributed online using Google Form over a period of two months. The form contained a screening question on the length of application use, and data collection continued until 96 responses meeting both criteria had been obtained.

The questionnaire consisted of a respondent profile section and 18 statements measured on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The indicators were adapted from prior instruments, as summarised in Table 1.

**Table 1. Operational definitions and indicators of variables**

| Variable                  | Definition                                                                                      | Indicators (items)                                                                                  | Source                                              |
|---------------------------|-------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| Extent of use (X1)        | Intensity and breadth of use of the digital inventory system in daily operations                | Frequency of use; variety of features used; reliance on the system for stock decisions (4 items)    | Doll & Torkzadeh (1998); DeLone & McLean (2003)     |
| System integration (X2)   | Degree to which the inventory system is connected with sales, purchasing, and financial records | Integration with sales; with purchasing/suppliers; with financial reports; real-time data (4 items) | Rabinovich et al. (2003); Puspitawati et al. (2024) |
| Perceived usefulness (X3) | Belief of the user that the system improves job performance                                     | Faster work; better performance; greater effectiveness; easier work (4 items)                       | Davis (1989)                                        |
| Operational               | Ability to achieve                                                                              | Fewer stockouts; less                                                                               | Heizer et                                           |

| Variable       | Definition                                                | Indicators (items)                                                                                      | Source                              |
|----------------|-----------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-------------------------------------|
| efficiency (Y) | operational output with minimum time, cost, and inventory | overstock; shorter stock-taking; data accuracy; faster turnover; lower storage-related losses (6 items) | al. (2020); Panigrahi et al. (2024) |

Data were analysed with IBM SPSS in six stages (Ghozali, 2018). Item validity was tested with the Pearson item-total correlation, and an item was declared valid when its coefficient exceeded the critical value of 0.201 ( $df = 94$ ,  $\alpha = 0.05$ , two-tailed). Reliability was assessed with Cronbach's alpha, with a threshold of 0.70. Classical assumptions were tested using the Kolmogorov-Smirnov test on unstandardised residuals for normality (Sig. > 0.05), the variance inflation factor and tolerance for multicollinearity ( $VIF < 10$  and tolerance > 0.10), and the Glejser test for heteroscedasticity (Sig. > 0.05). Variable means were classified using an interval of 0.80: 1.00–1.80 very low, 1.81–2.60 low, 2.61–3.40 moderate, 3.41–4.20 high, and 4.21–5.00 very high. The hypotheses were then tested with the following multiple linear regression model:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e \quad (2)$$

where Y is operational efficiency,  $X_1$  is extent of use,  $X_2$  is system integration,  $X_3$  is perceived usefulness,  $\alpha$  is the constant,  $\beta_1$ – $\beta_3$  are regression coefficients, and  $e$  is the error term. The F-test was used for H1, the t-test for H2–H4, and the adjusted coefficient of determination (adjusted  $R^2$ ) to measure the explanatory power of the model, all at a significance level of 0.05.

## RESULTS AND DISCUSSION

The profile of the 96 respondents is presented in Table 2. Slightly more than half of the respondents were women (53.1 percent). Respondents were between 21 and 57 years old (mean 35.4 years), and most were aged 26–45 years (80.2 percent). Just over half had completed senior high school (51.0 percent), 35.4 percent held a bachelor's degree, 12.5 percent a diploma, and one respondent a master's degree. Business owners made up 63.5 percent of respondents, while the remaining 36.5 percent were employees in charge of stock. The businesses had operated for one to nine years (mean 4.5 years), most commonly for four to six years (43.8 percent). Most businesses were small, with one to four employees (79.2 percent), while 15.6 percent had five to seven employees and 5.2 percent were run by the owner alone.

**Table 2. Respondent profile (n = 96)**

| Characteristic | Category    | n  | %    |
|----------------|-------------|----|------|
| Gender         | Female      | 51 | 53.1 |
|                | Male        | 45 | 46.9 |
| Age            | ≤ 25 years  | 9  | 9.4  |
|                | 26–35 years | 41 | 42.7 |
|                | 36–45 years | 36 | 37.5 |
|                | > 45 years  | 10 | 10.4 |

| Characteristic      | Category                | n  | %    |
|---------------------|-------------------------|----|------|
| Education           | Senior high school      | 49 | 51.0 |
|                     | Diploma (D3)            | 12 | 12.5 |
|                     | Bachelor (S1)           | 34 | 35.4 |
|                     | Master (S2)             | 1  | 1.0  |
| Position            | Owner                   | 61 | 63.5 |
|                     | Stock-managing employee | 35 | 36.5 |
| Business age        | 1–3 years               | 38 | 39.6 |
|                     | 4–6 years               | 42 | 43.8 |
|                     | 7–9 years               | 16 | 16.7 |
| Number of employees | None                    | 5  | 5.2  |
|                     | 1–4                     | 76 | 79.2 |
|                     | 5–7                     | 15 | 15.6 |

Source: primary data, processed (2026).

Table 3 shows that all 18 items were valid, with item-total correlations ranging from 0.741 to 0.850, well above the critical value of 0.201 and significant at the 0.01 level. All four variables were reliable, with Cronbach's alpha values between 0.796 and 0.866, exceeding the 0.70 threshold. The instrument is therefore suitable for further analysis.

**Table 3. Validity and reliability test results**

| Variable                   | Item-total correlation (r)               | r table | Cronbach's alpha |
|----------------------------|------------------------------------------|---------|------------------|
| Extent of use (X1)         | 0.843; 0.845; 0.840; 0.850               | 0.201   | 0.866            |
| System integration (X2)    | 0.832; 0.760; 0.768; 0.835               | 0.201   | 0.810            |
| Perceived usefulness (X3)  | 0.770; 0.774; 0.815; 0.793               | 0.201   | 0.796            |
| Operational efficiency (Y) | 0.744; 0.741; 0.767; 0.800; 0.774; 0.781 | 0.201   | 0.860            |

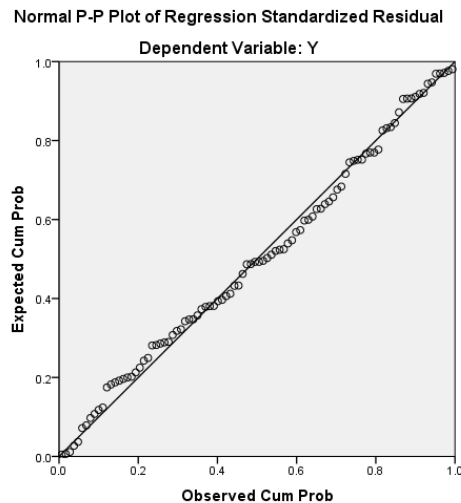
All correlations significant at  $p < 0.01$ . Source: SPSS output, processed (2026).

The classical assumption tests are summarised in Table 4. The Kolmogorov-Smirnov statistic of 0.058 with Asymp. Sig. 0.200 indicates that the residuals are normally distributed, which is consistent with the normal P-P plot in Figure 2, where the points follow the diagonal line. Tolerance values ranged from 0.778 to 0.925 and VIF values from 1.081 to 1.286, showing no multicollinearity. In the Glejser test, none of the independent variables significantly affected the absolute residuals (Sig. 0.562, 0.523, and 0.855), so the model is free of heteroscedasticity.

**Table 4. Classical assumption test results**

| Test                           | Indicator      | Value        | Criterion    | Conclusion           |
|--------------------------------|----------------|--------------|--------------|----------------------|
| Normality (Kolmogorov-Smirnov) | Asymp. Sig.    | 0.200        | > 0.05       | Normal               |
| Multicollinearity: X1          | Tolerance; VIF | 0.804; 1.244 | > 0.10; < 10 | No multicollinearity |
| Multicollinearity: X2          | Tolerance; VIF | 0.778; 1.286 | > 0.10; < 10 | No multicollinearity |
| Multicollinearity: X3          | Tolerance; VIF | 0.925; 1.081 | > 0.10; < 10 | No multicollinearity |
| Glejser: X1                    | Sig.           | 0.562        | > 0.05       | Homoscedastic        |
| Glejser: X2                    | Sig.           | 0.523        | > 0.05       | Homoscedastic        |
| Glejser: X3                    | Sig.           | 0.855        | > 0.05       | Homoscedastic        |

Source: SPSS output, processed (2026).

**Figure 2. Normal P-P plot of regression standardised residuals**

Descriptive statistics in Table 5 show that all variables fall into the high category. Perceived usefulness had the highest mean (3.77), indicating that respondents largely agree that the application makes stock management faster and easier; the item stating that the application makes work easier overall scored highest within this variable (3.89). System integration had the lowest mean (3.62), and its lowest-scoring items concerned real-time stock visibility (3.52) and the connection between the inventory application and financial reports (3.55). Within operational efficiency, the reduction of losses from damaged, expired, or missing goods scored highest (3.94), whereas faster inventory turnover scored lowest (3.56).

**Table 5. Descriptive statistics of research variables**

| Variable                   | N  | Mean | Std. deviation | Category |
|----------------------------|----|------|----------------|----------|
| Extent of use (X1)         | 96 | 3.70 | 0.888          | High     |
| System integration (X2)    | 96 | 3.62 | 0.770          | High     |
| Perceived usefulness (X3)  | 96 | 3.77 | 0.700          | High     |
| Operational efficiency (Y) | 96 | 3.70 | 0.750          | High     |

Source: SPSS output, processed (2026).

The regression results are reported in Table 6. Based on the unstandardised coefficients, the estimated regression equation is:

$$Y = 0.475 + 0.214X_1 + 0.208X_2 + 0.445X_3 \quad (3)$$

All three coefficients are positive, meaning that higher extent of use, stronger system integration, and greater perceived usefulness are each associated with higher operational efficiency when the other variables are held constant. The constant of 0.475 was not significant (Sig. 0.242).

**Table 6. Multiple linear regression and hypothesis test results**

| Variable                  | B     | Std. error | Beta  | t     | Sig.  | Decision    |
|---------------------------|-------|------------|-------|-------|-------|-------------|
| (Constant)                | 0.475 | 0.404      | –     | 1.177 | 0.242 | –           |
| Extent of use (X1)        | 0.214 | 0.075      | 0.254 | 2.856 | 0.005 | H2 accepted |
| System integration (X2)   | 0.208 | 0.088      | 0.214 | 2.367 | 0.020 | H3 accepted |
| Perceived usefulness (X3) | 0.445 | 0.089      | 0.415 | 5.018 | 0.000 | H4 accepted |

Dependent variable: operational efficiency (Y).  $F = 21.859$  (Sig. 0.000; H1 accepted);  $R = 0.645$ ;  $R^2 = 0.416$ ; adjusted  $R^2 = 0.397$ . Source: SPSS output, processed (2026).

The F-test yields  $F = 21.859$  with Sig. 0.000, indicating that extent of use, system integration, and perceived usefulness jointly have a significant effect on operational efficiency; H1 is therefore supported. The t-test results show that extent of use has a positive and significant effect on operational efficiency ( $t = 2.856$ ; Sig. 0.005), supporting H2. System integration also has a positive and significant effect ( $t = 2.367$ ; Sig. 0.020), supporting H3, and perceived usefulness has the strongest positive and significant effect ( $t = 5.018$ ; Sig. 0.000; Beta = 0.415), supporting H4. The adjusted  $R^2$  of 0.397 indicates that the three adoption dimensions explain 39.7 percent of the variation in operational efficiency, while the remaining 60.3 percent is explained by factors outside the model.

The significant effect of extent of use supports the argument of DeLone and McLean (2003) that system use is the channel through which an information system produces net benefits. A retailer that records every incoming and outgoing item and bases reorder decisions on system data works with accurate stock figures, which reduces both empty shelves and unsold accumulations. This finding is consistent with Nursasi and Fernanda (2026), who found that information technology adoption improves SME operational efficiency,

and with Islamiati et al. (2025), whose informants reported that a digital cashier application saved time and reduced recording errors. The standardised coefficient of X1 (0.254) is, however, smaller than that of perceived usefulness, suggesting that frequent use alone is not sufficient; how the system is valued and exploited also matters.

The effect of system integration, although significant, is the smallest of the three ( $\beta = 0.214$ ), and integration also has the lowest mean score. This pattern suggests that many small retailers in Kendari use their applications mainly as stand-alone sales and stock ledgers: sales transactions reduce stock automatically, but purchases from suppliers and financial reports are not always linked, and real-time stock visibility is not yet fully exploited. The positive effect agrees with Rabinovich et al. (2003) and with Puspitawati et al. (2024), who found that weak integration limits inventory efficiency. It also points to unrealised potential: if integration with purchasing and financial records were strengthened, its contribution to efficiency would likely increase.

Perceived usefulness emerges as the dominant predictor. This finding extends the Technology Acceptance Model (Davis, 1989), which is usually applied to explain intention to adopt, into the post-adoption stage, where users' belief in the system's value is associated with actual operational outcomes. It is in line with Damayanti et al. (2020), who found that perceived usefulness is a key driver of POS adoption among Indonesian MSMEs, and with Pramayasti and Herdinata (2025), who showed that perceived usefulness significantly increases the satisfaction of MSME owners using POS systems. Users who are convinced that the application makes their work faster and more effective are more likely to maintain disciplined data entry and use features such as minimum-stock alerts and stock reports, which directly reduce stockouts and stock-taking time.

Taken together, the results are consistent with the resource-based view (Barney, 1991): a digital inventory system becomes a performance-enhancing resource only when it is actively used, connected with other business processes, and valued by the people who operate it. The adjusted  $R^2$  of 39.7 percent also indicates that other factors, such as inventory management literacy and inventory control practices identified by Nursasi and Fernanda (2026), as well as supplier reliability and demand conditions, also shape operational efficiency. For practice, the findings suggest that retail owners should go beyond installing an application by recording all stock movements, connecting purchasing and financial records, and using real-time stock data for reorder decisions. Application providers and local MSME support agencies can contribute by offering feature-level training and assistance with system integration rather than focusing only on the number of adopters.

This study has several limitations. The cross-sectional design does not allow causal conclusions. All variables, including operational efficiency, were measured through respondents' perceptions in a single questionnaire, so common method variance may have inflated some relationships, especially between perceived usefulness and efficiency. The purposive sample of 96 retail SMEs in one city limits generalisability, and the Lemeshow formula strictly assumes random selection. Future studies could combine survey measures with objective indicators such as stockout frequency or inventory turnover taken from application records, use probability sampling across several cities, and examine mediating variables such as inventory control.

## CONCLUSION

Extent of use, system integration, and perceived usefulness of digital inventory management systems each have a positive and significant effect on the operational efficiency of retail SMEs in Kendari City, and jointly explain 39.7 percent of its variation, with perceived usefulness as the strongest predictor. Retail owners are advised to use all stock features consistently and connect their applications with purchasing and financial records. Application providers and MSME support agencies should provide feature and integration training, while future researchers should use objective efficiency indicators and probability samples.

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