



Evaluating Automation and Information Management in Sme Operations: Effects on Operational Efficiency and Decision-Making

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Abstract	Original Research Article
Small and Medium-sized Enterprises (SMEs) increasingly depend on computerized information systems to manage inventory, sales, product information, and other operational activities. Automation can reduce repetitive manual work, while accurate and accessible information can support timely business decision-making. However, the extent to which these capabilities contribute to operational efficiency and decision-making in SME environments requires empirical evaluation. This study evaluated the relationship between automation and operational efficiency and examined the relationship between information quality and accessibility and business decision-making within SME operations, using a computerized inventory/business management system as the practical context. A quantitative survey research design was adopted, and data were collected using a structured questionnaire administered to individuals with experience using or evaluating computerized inventory/business management systems. A total of 106 responses were obtained, of which 103 eligible responses were included in the principal statistical analysis. Data were analyzed using descriptive statistics, Cronbach's alpha, Pearson product-moment correlation, and simple linear regression. The reliability analysis demonstrated acceptable to excellent internal consistency across the principal constructs, with Cronbach's alpha values ranging from 0.741 to 0.915. Automation showed a significant positive relationship with operational efficiency ($r = 0.644$, $p < 0.001$) and explained approximately 41.5% of the variance in operational-efficiency scores ($R^2 = 0.415$, $p < 0.001$). Information quality and accessibility demonstrated a stronger positive relationship with decision-making ($r = 0.702$, $p < 0.001$) and explained approximately 49.2% of the variance in decision-making ($R^2 = 0.492$, $p < 0.001$). The decision-making construct recorded a mean score of 4.14, indicating a generally positive perception among respondents. However, the image-based product-import feature recorded a comparatively low mean score of 2.46, indicating an area requiring further improvement. The findings indicate that automation is significantly associated with operational efficiency, while information quality and accessibility are significantly associated with business decision-making. The study therefore demonstrates the potential value of computerized information systems in improving SME operations and supporting business decisions, while highlighting the need for continuous improvement of individual automated features, particularly image-based data import. Future research should complement user-perception measures with objective indicators such as task-completion time, data-entry accuracy, and long-term operational performance. Keywords: automation, information management, small and medium-sized enterprises, operational efficiency, decision-making, inventory management, information systems, digital transformation, optical character recognition.	
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1. Introduction

Small and Medium-sized Enterprises (SMEs) constitute a vital component of economic development across both developed and developing economies. Through employment generation, provision of goods and services, and contribution to local and national economic activities, SMEs serve as engines of growth and innovation (Adegbite et al., 2021). As these enterprises expand their operations, the volume and complexity of information required to manage daily activities increase substantially. Information relating to products, inventory levels, sales transactions, operating expenses, customer records, and business performance must be systematically collected, stored, updated, and retrieved when required for operational and strategic purposes.

Traditionally, many small businesses have relied on notebooks, paper records, spreadsheets, or combinations of manual and rudimentary computerized methods to manage business information. Although these approaches may be adequate for businesses with relatively small transaction volumes, they become increasingly difficult to manage as business activities expand (Raut et al., 2020). Manual record keeping demands considerable time and effort, while the retrieval and updating of information becomes progressively more challenging as records accumulate in volume. Furthermore, manual systems are susceptible to human error, data inconsistency, and limited accessibility, all of which can impede effective business management (Sagala & Öri, 2024).

Information systems provide organizations with computerized methods for collecting, processing, storing, and retrieving information in structured and efficient ways. Within SME contexts, information systems can support a range of operational activities including inventory management, sales recording, product catalog management, financial reporting, and business performance monitoring. Previous research has demonstrated that the adoption of information systems can play an important role in supporting the digital transformation of SMEs and in improving organizational processes (Alshamaila et

al., 2013). Digital transformation has increasingly become a critical area of SME development, with the integration of digital technologies enabling SMEs to improve business processes, strengthen information management practices, and develop new ways of delivering value to customers (Sagala & Öri, 2024).

However, successful digital transformation depends not only on the availability of technology but also on organizational readiness, employee capabilities, technological resources, and appropriate implementation strategies (Ghobakhloo & Iranmanesh, 2021). One particularly important component of digital transformation is automation, which involves the use of technology to perform or simplify tasks that would otherwise require manual intervention. In business operations, automation can be applied to activities such as inventory updating, data entry, product registration, report generation, stock monitoring, and information retrieval (Appelbaum et al., 2020). For example, a computerized inventory system can allow users to add multiple product records through a bulk import function rather than entering every product individually. Similarly, an image-based import function using Optical Character Recognition (OCR) technology can potentially extract product information from images and reduce the amount of manual data entry required.

The potential benefits of automation are particularly relevant to inventory-related operations, where information must be frequently updated as goods are purchased, sold, or transferred between locations. Delays or errors in updating inventory information can affect the accuracy of stock records and subsequently influence purchasing decisions, sales fulfillment, and overall business performance (Wang & Strong, 1996). Beyond automation, information quality represents another critical consideration. A computerized system may store large quantities of information, but such information is only useful when it is sufficiently accurate, current, reliable, and accessible to those who need it (Wang & Strong, 1996). High-quality information can support managers and employees in understanding business conditions and making appropriate operational and strategic decisions.

Decision-making within SMEs often requires timely information about stock levels, product availability, sales performance, expenses, and other operational activities. When such information can be accessed quickly and reliably, business personnel are better positioned to make informed and timely decisions (Brynjolfsson & McElheran, 2016). Technology adoption research has also shown that users' perception of the usefulness and ease of use of a system can influence technology acceptance and utilization. Davis's (1989) Technology Acceptance Model (TAM) identifies perceived usefulness and perceived ease of use as important factors influencing users' acceptance of information technology. The Technology-Organization-Environment (TOE) framework further recognizes technological, organizational, and environmental factors as important influences on technology adoption decisions in organizational contexts (Tornatzky & Fleischer, 1990).

Despite the growing availability of computerized business systems, there remains a need to evaluate how automation and information management are actually associated with operational outcomes in SME environments. Much of the existing literature examines digital transformation broadly rather than focusing on specific forms of operational automation, and fewer studies examine automation and information quality simultaneously while linking them to separate operational outcomes (Sagala & Óri, 2024). Furthermore, automated data-import mechanisms such as Excel import and image-based OCR import can provide different levels of usefulness and accuracy, yet these features are not always evaluated separately in empirical research.

This study therefore focuses on evaluating the relationship between automation and operational efficiency, as well as the relationship between information quality and accessibility and business decision-making, within the specific context of computerized inventory and business management systems used by SMEs. The study uses users' perceptions of automation, information management, operational efficiency, and decision-making as the basis for empirical analysis. The following research questions guided the investigation:

1.1 Research Questions

1. What relationship exists between automation and operational efficiency in SME operations?
2. What relationship exists between information quality and accessibility and business decision-making?
3. To what extent does automation predict operational efficiency?
4. To what extent does information quality and accessibility predict business decision-making?
5. What areas of computerized system functionality require further improvement?

1.2 Hypotheses

- H₀1. There is no significant relationship between automation and operational efficiency in SME operations.
- H₀2. There is no significant relationship between information quality and accessibility and business decision-making.
- H₀3. Automation does not significantly predict operational efficiency in SME operations.
- H₀4. Information quality and accessibility do not significantly predict business decision-making.

1.3 Significance of the Study

The findings of this study may benefit multiple stakeholders. For SME owners and managers, the results may help illuminate the potential contribution of computerized automation and information management to business operations, and assist in identifying areas where technology can reduce repetitive work and improve access to business information. For software developers, the study provides useful feedback regarding the design of inventory and business-management systems, particularly in identifying useful features and areas requiring improvement such as automated data-import functions. For employees and system users,

the study demonstrates how computerized systems can simplify routine activities, reduce repetitive information entry, and make business information easier to access. For researchers, the study contributes empirical evidence to the literature on SME digital transformation, automation, information systems, operational efficiency, and decision-making, while providing a basis for further research involving larger samples, additional SME sectors, different automation technologies, and objective measurements of operational performance.

1.4 Scope of the Study

The study focuses specifically on automation and information management within SME operations. The examined variables include automation of routine business activities, automated product and stock information import (including Excel-based and image-based import), operational efficiency, information quality and accessibility, business decision-making, and the overall perceived impact of computerized information systems. The study does not attempt to examine every factor that may influence SME performance; factors such as organizational culture, employee satisfaction, long-term profitability, access to finance, and broader macroeconomic conditions are outside the primary scope of the investigation.

2. Literature Review

2.1 Theoretical Framework

Technology Acceptance Model

The Technology Acceptance Model (TAM), developed by Davis (1989), provides a theoretical foundation for understanding users' acceptance of information technology. TAM proposes that two major factors influence technology acceptance: perceived usefulness and perceived ease of use. Perceived usefulness refers to the extent to which an individual believes that using a particular system will improve job performance, while perceived ease of use refers to the extent to which an individual believes that using the system will require little effort (Davis, 1989). The theory is relevant to this study

because users are more likely to perceive computerized systems positively when the systems provide useful functions and are sufficiently easy to operate. Venkatesh and Davis (2000) extended TAM to include social influence and cognitive instrumental processes, further enriching the model's explanatory power in organizational contexts.

Technology-Organization-Environment Framework

The Technology-Organization-Environment (TOE) framework, developed by Tornatzky and Fleischer (1990), provides a comprehensive lens for understanding organizational technology adoption. The framework considers three major contexts: the technological context, which includes the characteristics and availability of relevant technologies; the organizational context, which encompasses organizational resources, management support, employee skills, and organizational structure; and the environmental context, which includes external factors such as competition, customers, suppliers, and the broader business environment. The TOE framework is particularly relevant to SME digital transformation because technology adoption in smaller enterprises can be influenced by conditions both within and outside the organization (Tornatzky & Fleischer, 1990). Recent applications of the TOE framework in SME contexts have confirmed its utility in explaining technology adoption decisions and outcomes (Ghobakhloo & Iranmanesh, 2021).

2.2 Small and Medium-Sized Enterprises and Digital Transformation

Small and Medium-sized Enterprises constitute an important component of economic activity across diverse sectors including retail, manufacturing, services, healthcare, distribution, and other commercial activities. Despite their economic significance, SMEs frequently face challenges associated with limited financial resources, constrained technological capabilities, gaps in employee skills, and restricted access to specialized expertise (Adegbite et al., 2021). These limitations

can affect their ability to adopt and effectively utilize digital technologies. Digital transformation provides SMEs with opportunities to improve internal processes, manage information more effectively, and increase their responsiveness to changing business requirements. However, successful implementation of digital technologies requires more than the mere purchase or development of software; organizational capabilities and digital skills also play critical roles (Sagala & Óri, 2024).

A systematic literature review by Sagala and Óri (2024) identified several factors influencing successful SME digital transformation, including technology characteristics, organizational capabilities, strategic alignment, and human resource factors. Their findings suggest that digital transformation should be examined not merely as technology adoption but as a holistic process involving the interplay of technology, people, and organizational processes. Similarly, research by Ghobakhloo and Iranmanesh (2021) on Industry 4.0 adoption in manufacturing SMEs found that technological readiness, organizational factors, and environmental pressures all significantly influenced adoption decisions and outcomes.

In the Nigerian context specifically, Adegbite et al. (2021) examined the determinants of SME performance and found that technological capability, access to finance, and managerial competencies were significant predictors of business performance. Their study underscores the importance of technological resources in SME development, while also highlighting the constraining effects of limited access to finance and skilled personnel. These findings are consistent with broader research indicating that SMEs in developing economies face compounded challenges in digital transformation due to infrastructure deficits and resource constraints (Raut et al., 2020).

2.3 Information Systems in SMEs

An information system can be described as an organized combination of people, procedures, data, and technology used to collect, process, store, and distribute information for organizational purposes (Laudon & Laudon, 2020). Within SMEs,

information systems can support several business activities including inventory management, sales management, customer relationship management, financial management, product management, reporting, and business monitoring. Levy and Powell (2000) emphasized that information systems strategies for SMEs should consider organizational requirements and business processes rather than focusing exclusively on technology capabilities. This process-oriented perspective is particularly important because the value of an information system should be assessed in relation to how effectively it supports actual business activities rather than merely its technical specifications.

Research into SME information system adoption indicates that organizational characteristics, technological factors, and the business environment can collectively influence the adoption and effectiveness of information technology (Alshamaila et al., 2013). In their study of cloud computing adoption by SMEs in the northeast of England, Alshamaila et al. (2013) developed a multi-perspective framework that incorporated technological, organizational, and environmental factors to explain adoption decisions. Their findings revealed that relative advantage, compatibility, and top management support were significant determinants of cloud computing adoption, while complexity and cost concerns acted as barriers. These findings align with the broader technology adoption literature and have direct implications for the design and implementation of computerized business management systems in SME contexts.

More recently, the proliferation of cloud-based and mobile information systems has expanded the range of technological options available to SMEs. Raut et al. (2020) conducted a systematic review of digital transformation in SMEs and found that the adoption of digital technologies was positively associated with operational performance, innovation capability, and competitive advantage. However, they also noted that the magnitude of these benefits varied considerably depending on the specific technologies adopted, the implementation approach, and the organizational context. This variability underscores the need for context-specific empirical research that examines the actual effects of particular information

system features on defined operational outcomes.

2.4 Automation in Business Operations

Automation involves using technology to perform tasks with limited or reduced manual intervention. In SME operations, automation can be applied to product registration, inventory updating, data import, stock calculations, report generation, low-stock monitoring, expiry monitoring, and information retrieval (Appelbaum et al., 2020). The potential of automation to reduce repetitive work and improve processing speed has been documented across various industries and organizational contexts. Appelbaum et al. (2020) examined the impact of artificial intelligence and automation on organizational performance and found that process automation was associated with significant improvements in operational efficiency, particularly in routine and repetitive tasks.

However, automation can only produce useful outcomes when the automated process is sufficiently accurate and appropriate for the task at hand. Poorly implemented automation may introduce errors, require additional corrective work, or create new operational bottlenecks (Brynjolfsson & McElheran, 2016). Consequently, this study evaluates automation through users' perceptions of its contribution to business activities rather than assuming that the mere existence of an automated feature automatically represents improved efficiency. This perceptual approach is consistent with the Technology Acceptance Model, which emphasizes the importance of user perceptions in determining technology outcomes (Davis, 1989).

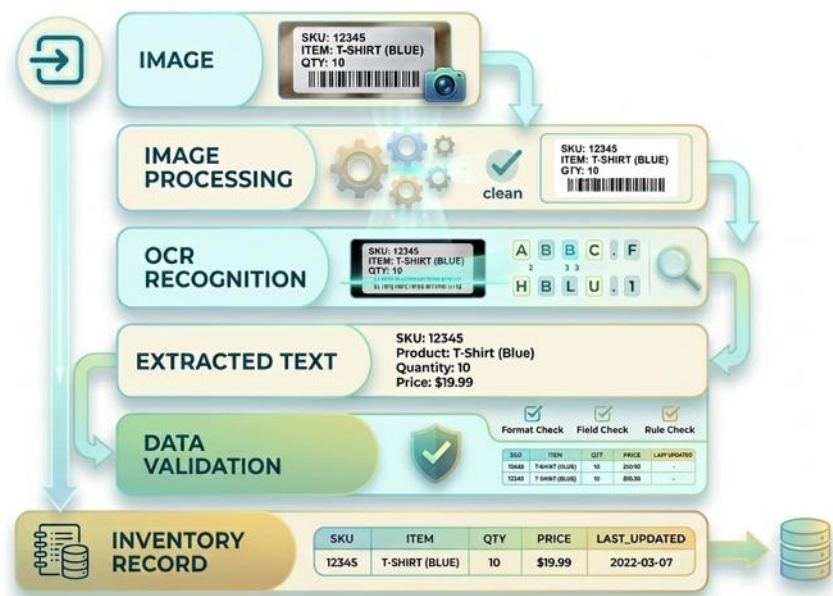
In the specific domain of inventory management, automation can address several critical operational challenges. Accurate inventory information helps businesses determine what products are currently available, which products require replenishment, how many units remain in stock, which products are moving quickly, and which products may require managerial attention (Laudon & Laudon, 2020). Computerized inventory systems can automate portions of these monitoring activities and provide users with structured access to inventory information, thereby reducing the cognitive and manual burden on business personnel.

2.5 Automated Data Import Mechanisms

Excel-Based Data Import

Spreadsheets are widely used by SMEs because they are accessible, flexible, and require minimal technical expertise. However, transferring information manually from a spreadsheet into a dedicated business system can create substantial additional data-entry work and increase the risk of transcription errors. An Excel import function provides a means of transferring multiple records into a computerized system in a single operation, thereby reducing manual effort and improving data consistency. The effectiveness of this approach depends on factors such as correct spreadsheet structure, data consistency, validation procedures, error handling, and system compatibility (Laudon & Laudon, 2020). Excel import therefore represents an important example of operational automation within the context of SME business management systems.

Figure 1: Image-Based Data Import and Optical Character Recognition Process



Optical Character Recognition (OCR) is a technology that enables computers to identify and convert text contained in images into machine-readable information. Image-based data import can potentially assist businesses where product information is available in printed lists, documents, or other image formats. Although this process has the potential to reduce manual data entry, OCR accuracy may be affected by image quality, font type, document layout, lighting conditions, resolution, handwriting, and other factors (Nurminen et al., 2022). Therefore, the effectiveness of image-based import may differ substantially from structured data import methods such as Excel. This distinction is particularly relevant to the present study because the questionnaire separately examined the perceived usefulness of image-based import as distinct from other automation features.

2.6 Information Quality and Accessibility

Information quality concerns the usefulness and characteristics of information produced or stored by an information system. Important dimensions of information quality include accuracy, completeness,

timeliness, reliability, and relevance (Wang & Strong, 1996). High-quality information can improve users' confidence in the information they use during business activities and reduce the likelihood of erroneous decisions. In an inventory management environment, for example, inaccurate stock information could lead to inappropriate purchasing decisions, stockouts, or excess inventory holding, all of which have direct financial implications for the business.

Information accessibility refers to the ease with which users can obtain the information they need when they need it. A computerized system can improve information accessibility by providing search functions, organized records, reports, dashboards, automated notifications, and centralized information storage (Laudon & Laudon, 2020). Accessibility is particularly important when business decisions must be made quickly or when multiple stakeholders require simultaneous access to the same information. A system may contain accurate information but still provide limited practical value if users cannot easily retrieve that information in a timely manner. The present study therefore combines information quality and accessibility as an integrated

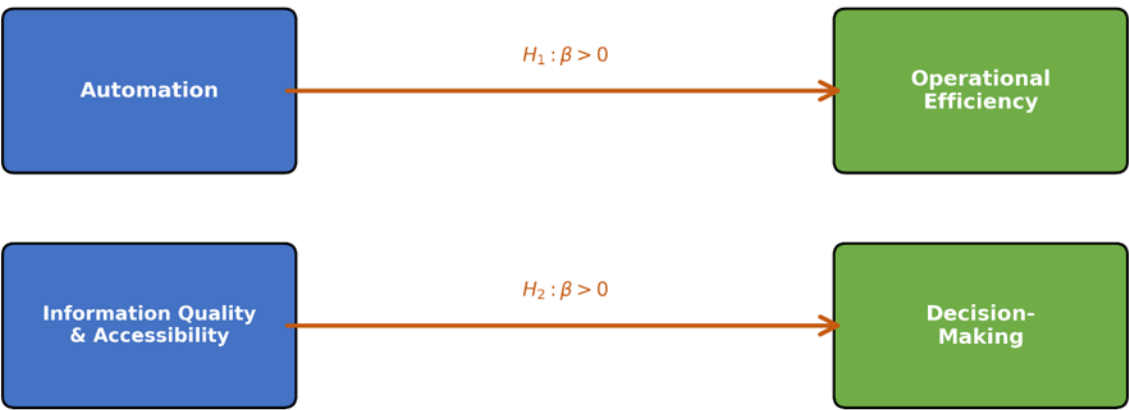
research construct, reflecting the interdependence of these two dimensions in supporting effective business decision-making.

2.7 Operational Efficiency and Decision-Making in SMEs

Operational efficiency refers to the ability of an organization to perform its activities effectively while minimizing unnecessary time, effort, and resource consumption. In the context of this study, operational efficiency encompasses reduced repetitive work, faster inventory updates, faster information retrieval, reduced manual effort, and a reduction in avoidable errors. Digital transformation research has identified process improvements and operational performance as important potential benefits of digital technologies in SMEs (Raut et al., 2020). The relationship between automation and operational efficiency is therefore one of the principal relationships examined in this research.

Decision-making is an essential part of business management at all organizational levels. SME owners and managers make decisions concerning inventory replenishment, product availability, pricing, sales strategies, expense management, product performance evaluation, and overall business operations. The quality of such decisions depends critically on the information available to decision-makers at the time the decision is made (Brynjolfsson & McElheran, 2016). An information system can support decision-making by providing organized, accurate, and accessible information that reduces uncertainty and enables more informed choices. Digital transformation studies have identified information availability and digital capabilities as important components of improved business processes and managerial activities (Sagala & Őri, 2024). The present study therefore investigates whether information quality and accessibility are significantly associated with decision-making quality in SME operations.

Figure 2: Conceptual Framework



2.8 Research Gap

Although existing research has established the general importance of digital transformation and information systems for SMEs, several gaps remain

in the literature. First, many studies examine digital transformation broadly rather than focusing on specific forms of operational automation and their direct effects on efficiency outcomes. Second, fewer studies examine automation and information quality

and accessibility simultaneously while linking them to separate operational outcomes within the same empirical framework. Third, automated data-import mechanisms such as Excel import and image-based OCR import can provide different levels of usefulness and accuracy, yet these features are not always evaluated separately in empirical research. Fourth, there is a need for empirical evidence based on actual users and evaluators of computerized SME business management systems rather than on theoretical projections or vendor claims. This study addresses these gaps by examining the relationships between automation and operational efficiency and between information quality and accessibility and decision-making, using questionnaire data obtained from respondents with direct experience using or evaluating computerized inventory and business management systems.

3. Method

3.1 Research Design

The study adopted a quantitative survey research design. This design was selected because the study sought to obtain measurable responses from users and evaluators of a computerized inventory and business management system and to statistically examine relationships between automation, information management, operational efficiency, and decision-making. The survey approach allowed respondents to provide standardized responses using a five-point Likert scale, facilitating quantitative analysis and comparison across respondents. Quantitative survey designs are well-suited for examining relationships between variables in large samples and for testing hypotheses using inferential statistical techniques (Creswell & Creswell, 2018).

3.2 Study Population and Sampling

The population consisted of individuals involved in SME business activities who had experience using or

evaluating the computerized inventory and business management system examined in the study. The respondents included business owners, managers, sales personnel, inventory and stock personnel, and accounting and finance personnel. The businesses represented different operational categories, including supermarkets and grocery businesses, pharmacies, electronics and phone businesses, warehouses, clothing businesses, retail businesses, and cosmetics businesses. A purposive sampling approach was used, whereby respondents were selected based on their relevance to the research objectives, particularly their direct experience with computerized inventory and business management systems. Purposive sampling is appropriate when the research requires participants with specific knowledge or experience related to the phenomenon under investigation (Creswell & Creswell, 2018).

A total of 106 questionnaire responses were collected. After screening the responses, 103 valid responses were used for the main statistical analysis. Three responses were excluded because respondents indicated that they had not used the computerized system being evaluated. Therefore, $N = 103$ was used as the principal analytical sample, representing a valid response rate of 97.2%.

3.3 Research Instrument

Data were collected using a structured questionnaire administered through Google Forms. The questionnaire consisted of seven major sections: Section A addressed eligibility and business information; Section B measured automation; Section C measured operational efficiency; Section D measured information quality and accessibility; Section E measured decision-making; Section F measured overall impact; and Section G provided space for additional comments. The principal measurement items used a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

Table 1: Likert scale response and scoring system used in the questionnaire.

Response	Score
Strongly Disagree	1
Disagree	2
Neutral	3
Agree	4
Strongly Agree	5

Automation was measured through five items addressing the reduction of repetitive data entry, easier addition of multiple product records, Excel-based product import, image-based product import, and improved efficiency of inventory updating. The composite score was computed as the mean of the five items. The image-import item was subsequently examined separately because its response pattern differed considerably from the other automation items. Operational efficiency was measured using five items examining reduced time, faster inventory updates, reduced errors, information retrieval speed, and overall operational efficiency. Information quality and accessibility was measured using four items addressing accuracy, currency, accessibility, and reliability of business information. Decision-making was measured using five items addressing the usefulness, speed, and quality of business decision-making. Overall impact was measured using three items.

The composite scores were calculated as follows:

Automation: $A = (Q7 + Q8 + Q9 + Q10 + Q11) / 5$

Operational Efficiency: $OE = (Q12 + Q13 + Q14 +$

$Q15 + Q16) / 5$

Information Quality and Accessibility: $IQ = (Q17 + Q18 + Q19 + Q20) / 4$

Decision-Making: $DM = (Q21 + Q22 + Q23 + Q24 + Q25) / 5$

Overall Impact: $OI = (Q26 + Q27 + Q28) / 3$

3.4 Validity and Reliability

Content validity was addressed by ensuring that questionnaire items corresponded directly with the research objectives, research questions, and conceptual framework. Internal consistency was evaluated using Cronbach's alpha, with values ranging from .741 to .915 across the principal constructs, indicating acceptable to excellent reliability.

Cronbach's alpha was calculated using:

$$\alpha = [k / (k - 1)] [1 - (\sum \sigma_i^2 / \sigma T^2)]$$

where k = number of items; σ_i^2 = variance of each item; and σT^2 = variance of the total score.

Table 2: Cronbach's alpha reliability coefficients for the principal research constructs (N = 103).

Construct	Number of Items	Cronbach's Alpha	Interpretation
Automation	5	.741	Acceptable
Automation (excl. image import)	4	.886	Very Good
Operational Efficiency	5	.902	Excellent
Information Quality & Accessibility	4	.896	Very Good
Decision-Making	5	.915	Excellent
Overall Impact	3	.837	Good

3.5 Data Analysis

The principal formulas used in the statistical analysis were:

Percentage: $P = (f / N) \times 100$

Mean: $\bar{X} = \Sigma X / N$

Sample Standard Deviation: $SD = \sqrt{[\Sigma(X_i - \bar{X})^2 / (N - 1)]}$

Pearson Product-Moment Correlation: $r = \{N\Sigma XY - (\Sigma X)(\Sigma Y)\} / \sqrt{\{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]\}}$

Simple Linear Regression: $Y = \beta_0 + \beta_1 X + \varepsilon$

Coefficient of determination: $R^2 =$ proportion of variance in the dependent variable explained by the regression model.

The collected data were analyzed using quantitative statistical techniques. Frequencies and percentages were used to summarize respondent characteristics. Means and standard deviations were used to determine the average response and dispersion for each research construct. Pearson product-moment correlation was used to examine the relationships between (a) automation and operational efficiency and (b) information quality and accessibility and decision-making. Simple linear regression was used to determine the extent to which automation

predicted operational efficiency and the extent to which information quality and accessibility predicted decision-making. The coefficient of determination (R^2) was used to assess the proportion of variance in the dependent variables explained by the independent variables. All hypotheses were tested at the .05 level of significance. The null hypothesis was rejected when the obtained p-value was less than .05.

Ethical considerations were addressed by ensuring that participation was voluntary, respondents were informed of the purpose of the research, and no information was collected that could unnecessarily identify individual respondents. Responses were used for research purposes only and analyzed in aggregate form.

4. Results

4.1 Response Rate and Data Screening

A total of 106 questionnaire responses were obtained. Following screening, 103 valid responses were used for the principal statistical analysis, representing a valid response rate of 97.2%. Three responses were excluded because respondents indicated that they had not used the computerized system being evaluated.

Table 3: Distribution of valid and ineligible questionnaire responses

Response Category	Frequency	Percentage
Valid responses	103	97.2
Ineligible responses	3	2.8
Total responses	106	100.0

4.2 Respondent Characteristics

Table 4 presents the distribution of respondents by organizational position. Business owners represented the largest group of respondents at 50.0%, followed by managers at 23.6%, sales staff at 17.0%, inventory

and stock staff at 6.6%, and accounting and finance staff at 2.8%. This distribution is consistent with the study's focus on SME operations, where owners and managers are typically most directly involved in system evaluation and utilization decisions.

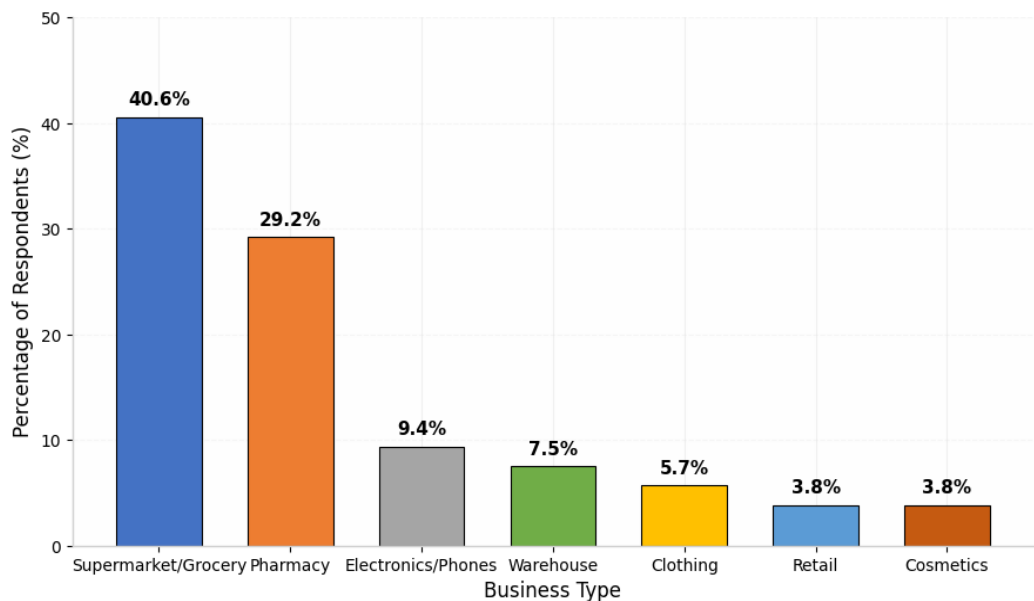
Table 4: Distribution of respondents by organizational position (N = 106).

Position	Frequency	Percentage
Business Owner	53	50.0
Manager	25	23.6
Sales Staff	18	17.0
Inventory/Stock Staff	7	6.6
Accountant/Finance Staff	3	2.8
Total	106	100.0

With respect to business type, supermarket and grocery businesses constituted the largest category at 40.6%, followed by pharmacies at 29.2%. The inclusion of different business categories provides

evidence from several types of SME operations rather than from a single business sector, enhancing the generalizability of the findings. Figure 3 presents the distribution of respondents by business type.

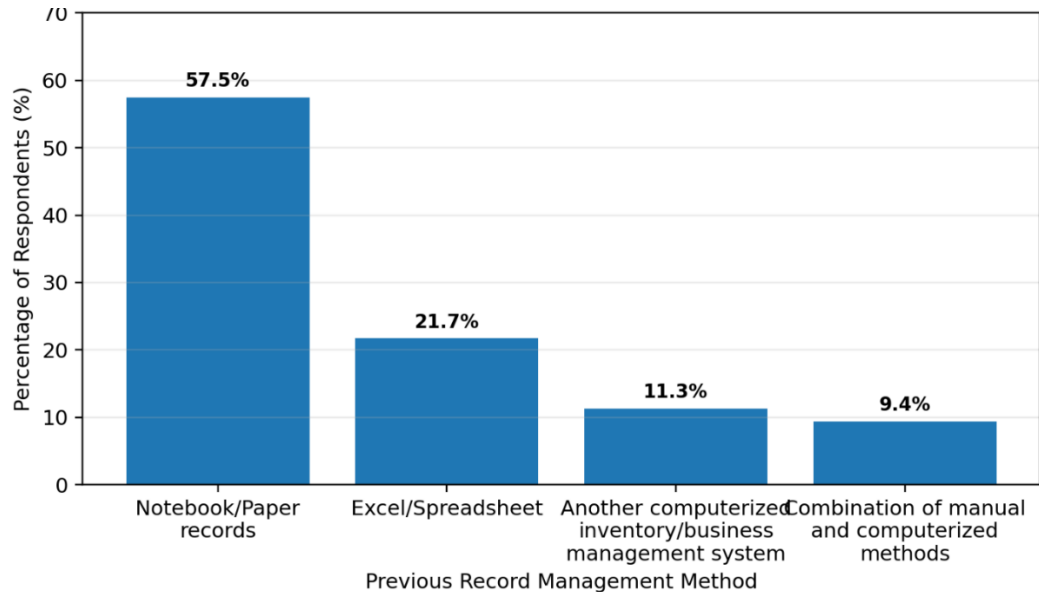
Figure 3: Distribution of Respondents by Business Type (N = 106)



Before using the computerized system, the majority of respondents (57.5%) relied primarily on notebook or manual records for managing business information. An additional 21.7% used Excel/spreadsheets, 11.3% used another computerized inventory/business management system, and 9.4% used a combination of manual and

computerized methods. This distribution highlights the substantial transition from manual record-keeping methods to computerized information management that many SMEs in the sample were undertaking. Figure 4 presents the distribution of previous record management methods.

Figure 4: Methods Previously Used to Manage Business Records (N = 106)



4.3 Descriptive Analysis of Research Variables

The descriptive analysis showed generally positive perceptions of computerized information management across all major constructs. The mean scores ranged from 3.80 to 4.14 on the five-point Likert scale, indicating that respondents generally

agreed that the computerized system contributed positively to their business operations. Decision-making recorded the highest construct mean of 4.14, followed by information quality and accessibility at 4.05, overall impact at 3.98, operational efficiency at 3.92, and automation at 3.80.

Table 5: Descriptive statistics for the principal research constructs. Scale: 1 = Strongly Disagree to 5 = Strongly Agree.

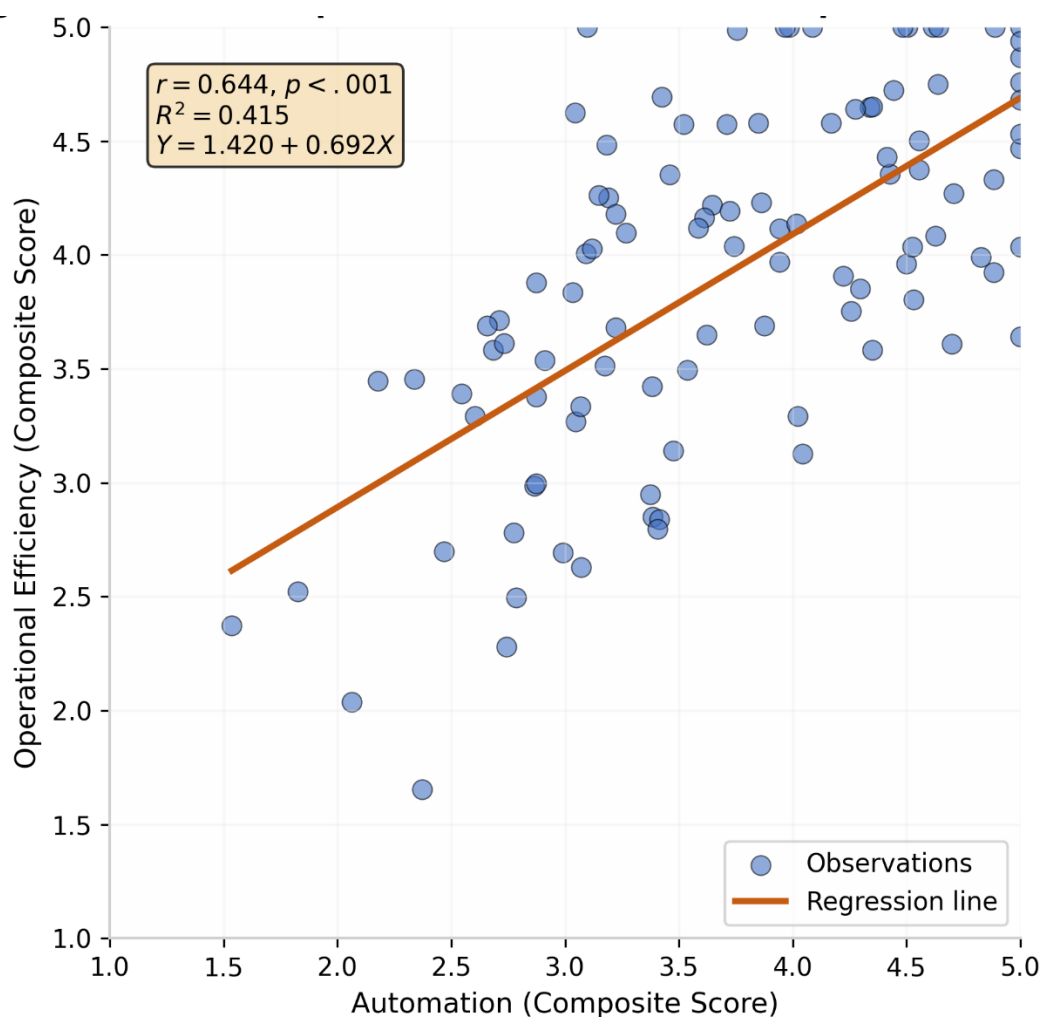
Construct	N	Mean	SD	Interpretation
Automation	103	3.80	0.78	Agree
Operational Efficiency	103	3.92	0.82	Agree
Information Quality & Accessibility	103	4.05	0.72	Agree
Decision-Making	103	4.14	0.75	Agree
Overall Impact	103	3.98	0.68	Agree

4.4 Correlation Analysis

Automation and Operational Efficiency

Pearson product-moment correlation was used to examine the relationship between automation and operational efficiency. The analysis produced a correlation coefficient of $r = .644$ with a p-value of

less than .001. This result indicates a moderately strong positive relationship between automation and operational efficiency, suggesting that higher levels of perceived automation are associated with higher levels of perceived operational efficiency. Figure 5 presents the scatter plot showing the relationship between automation and operational efficiency.

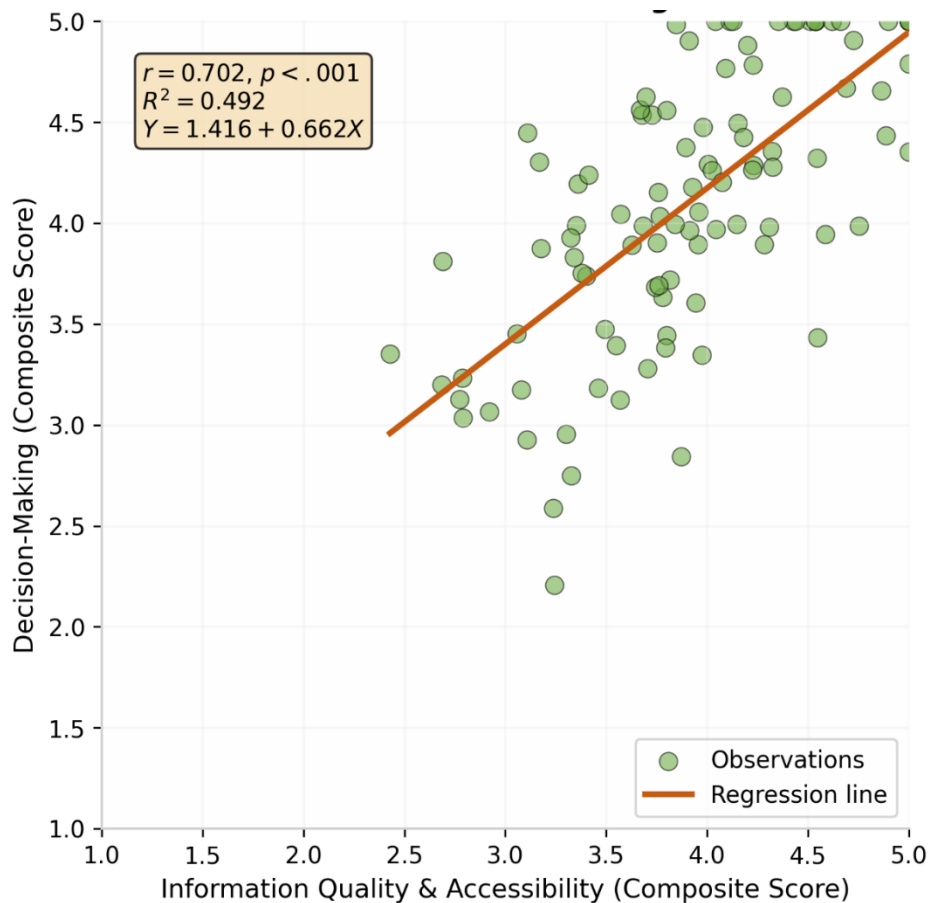
Figure 5: Relationship between Automation and Operational Efficiency

Information Quality and Accessibility and Decision-Making

Pearson product-moment correlation was used to examine the relationship between information quality and accessibility and business decision-making. The analysis produced a correlation coefficient of $r = .702$ with a p-value of less than

.001. This result indicates a strong positive relationship between information quality and accessibility and business decision-making, suggesting that higher levels of perceived information quality and accessibility are associated with better perceived business decision-making. Figure 6 presents the scatter plot showing this relationship.

Figure 6: Relationship between Information Quality/Accessibility



4.5 Regression Analysis

Automation Predicting Operational Efficiency

Simple linear regression was conducted to examine the extent to which automation predicted operational efficiency. The regression analysis showed a positive and statistically significant relationship. The model produced an R^2 value of .415, indicating that automation explained approximately 41.5% of the variance in operational efficiency scores. The regression coefficient for automation was positive and significant ($\beta = .692$, $t = 8.467$, $p < .001$). The overall regression model was also statistically significant ($F = 71.696$, $p < .001$). The regression equation was:

$$\text{Operational Efficiency} = 1.420 + 0.692(\text{Automation})$$

The positive regression coefficient indicates that

higher levels of automation were associated with higher levels of operational efficiency. For every one-unit increase in the automation composite score, operational efficiency was predicted to increase by approximately 0.692 units, holding other factors constant.

Information Quality and Accessibility Predicting Decision-Making

Simple linear regression was also conducted to examine the extent to which information quality and accessibility predicted business decision-making. The regression analysis showed a positive and statistically significant relationship. The model produced an R^2 value of .492, indicating that information quality and accessibility explained approximately 49.2% of the variance in decision-

making scores. The regression coefficient was positive and significant ($\beta = .662$, $t = 9.892$, $p < .001$). The overall regression model was statistically significant ($F = 97.861$, $p < .001$). The regression equation was:

$$\text{Decision-Making} = 1.416 + 0.662(\text{Information Quality \& Accessibility})$$

The positive regression coefficient indicates that higher levels of information quality and accessibility were associated with higher levels of decision-making quality. For every one-unit increase in the information quality and accessibility composite score, decision-making was predicted to increase by approximately 0.662 units, holding other factors constant.

Table 6: Summary of regression analysis results (N = 103).

Model	R	R ²	F	p	B	t	p
Automation → Operational Efficiency	.644	.415	71.696	<.001	.692	8.467	<.001
IQ & Accessibility → Decision-Making	.702	.492	97.861	<.001	.662	9.892	<.001

4.6 Hypothesis Testing

The four null hypotheses were tested at the .05 level of significance. Pearson correlation results were used

to test H₀₁ and H₀₂, while regression results were used to test H₀₃ and H₀₄. Table 7 presents a summary of the hypothesis testing results.

Table 7: Summary of hypothesis testing results. All tests significant at $\alpha = .05$ (N = 103).

Hypothesis	Test	Statistic	P	Decision
H ₀₁ : No relationship between automation and operational efficiency	Pearson r	$r = .644$	<.001	Rejected
H ₀₂ : No relationship between IQ/accessibility and decision-making	Pearson r	$r = .702$	<.001	Rejected
H ₀₃ : Automation does not predict operational efficiency	Regression	$\beta = .692$, $t = 8.467$	<.001	Rejected
H ₀₄ : IQ/accessibility does not predict decision-making	Regression	$\beta = .662$, $t = 9.892$	<.001	Rejected

All four null hypotheses were rejected. The results provide evidence that automation is significantly related to and predicts operational efficiency, while

information quality and accessibility are significantly related to and predict business decision-making in SME operations.

4.7 Image-Based Import Feature

Mean calculation for the image-import responses:

$$\bar{X} = \Sigma(f_i x_i) / N = [23(1) + 33(2) + 29(3) + 13(4) + 5(5)] / 103 = 2.46$$

Sample standard deviation calculation:

$$SD = \sqrt{[\Sigma f_i(x_i - \bar{X})^2 / (N - 1)]} = 1.12$$

Thus, the image-based import feature had $\bar{X} = 2.46$ and $SD = 1.12$ ($N = 103$).

Respondents' views on whether the image-based import feature reduces the manual effort required to enter product information recorded a relatively low mean score of 2.46 ($SD = 1.12$), which falls between "Disagree" and "Neutral" on the Likert scale. This result suggests that the image-based import feature may require further improvement to effectively reduce manual data-entry effort. The distribution of responses showed that 54.4% of respondents either disagreed or strongly disagreed that the feature reduced manual effort, while only 17.5% agreed or strongly agreed.

Table 8: Distribution of responses on image-based product information import ($N = 103$).

Response	Frequency	Percentage
Strongly Disagree	23	22.3
Disagree	33	32.0
Neutral	29	28.2
Agree	13	12.6
Strongly Agree	5	4.9
Total	103	100.0

4.8 Analysis of Open-Ended Responses

The open-ended responses were treated as supplementary qualitative evidence. A total of 24 respondents provided written comments. Respondents identified improvements such as better monitoring of products approaching expiry, ability to add or update multiple stock records simultaneously, easier identification of business deficits, and improved business stability. Respondents also suggested additional features including barcode generation, online and cloud-based operation, and mobile application support. These qualitative insights complement the quantitative findings and provide direction for future system development.

5. Discussion

5.1 Automation and Operational Efficiency

The first major finding of this study was that automation was positively and significantly associated with operational efficiency. The Pearson correlation analysis produced $r = .644$, $p < .001$, indicating a moderately strong positive relationship. The regression analysis provided further support, with automation explaining approximately 41.5% of the variance in operational efficiency scores ($R^2 = .415$, $p < .001$). This finding is consistent with the theoretical proposition that automation can reduce repetitive activities and simplify routine business processes (Appelbaum et al., 2020). It also aligns

with empirical evidence from digital transformation research indicating that process automation is associated with improvements in operational efficiency, particularly for routine and repetitive tasks (Raut et al., 2020).

The finding supports the underlying argument of the Technology Acceptance Model that users are more likely to perceive positive outcomes when systems provide useful automated functions (Davis, 1989). In the SME context examined in this study, automation features such as bulk product import, automated inventory updating, and streamlined information retrieval appear to contribute meaningfully to users' perceptions of operational efficiency. This has practical implications for SME owners and managers considering investments in computerized business management systems, as well as for software developers designing systems for this market segment.

However, it is important to note that automation explained approximately 41.5% of the variance in operational efficiency, leaving nearly 59% of the variance unexplained. This suggests that other factors not examined in this study, such as organizational readiness, employee training, system usability, and external environmental conditions, may also play important roles in determining operational efficiency outcomes. Future research should therefore consider incorporating additional variables to develop a more comprehensive model of operational efficiency in SME contexts.

5.2 Information Quality, Accessibility, and Decision-Making

The second major finding was that information quality and accessibility demonstrated a strong positive relationship with decision-making ($r = .702$, $p < .001$). The regression analysis further showed that information quality and accessibility explained approximately 49.2% of the variance in decision-making scores ($R^2 = .492$, $p < .001$). This finding emphasizes the critical importance of accurate, reliable, current, and accessible business information in supporting effective decision-making within SMEs. The result is consistent with established information quality theory, which posits that

information must meet certain quality dimensions to be useful for decision-making purposes (Wang & Strong, 1996).

The finding also aligns with research by Brynjolfsson and McElheran (2016), who demonstrated that data-driven decision-making was associated with higher productivity and returns on assets in manufacturing firms. In the SME context, where managerial resources are often constrained and decision-makers may lack specialized analytical support, the availability of high-quality, accessible information through computerized systems may be particularly valuable. The mean score of 4.14 for the decision-making construct, the highest among all constructs measured, further underscores respondents' positive perceptions of the system's contribution to their decision-making processes.

The stronger relationship observed between information quality and accessibility and decision-making ($r = .702$) compared to the relationship between automation and operational efficiency ($r = .644$) may reflect the fundamental nature of decision-making as an information-intensive activity. While automation primarily affects the efficiency with which tasks are performed, information quality and accessibility directly influence the cognitive inputs available to decision-makers. This distinction has implications for system design priorities, suggesting that while automation features are important, the underlying information architecture and quality assurance mechanisms may be equally or more critical for supporting strategic business outcomes.

5.3 Previous Manual Record Management

A substantial proportion of respondents (57.5%) previously relied on notebook or manual records for managing business information. This finding demonstrates the practical context in which computerized systems are being introduced in many SMEs. The transition from manual records toward computerized information management represents a significant operational change that may reduce repetitive information-management activities and improve accessibility. This context helps explain the generally positive perceptions observed across the study constructs, as respondents may be comparing

the computerized system favorably against the limitations of their previous manual methods.

The prevalence of manual record-keeping among SMEs in developing economies has been documented in previous research. Adegbite et al. (2021) found that limited technological capability and access to finance were significant barriers to SME performance in Nigeria, suggesting that the adoption of computerized systems may be particularly impactful in such contexts. The findings of this study support this proposition by demonstrating positive associations between computerized system features and operational outcomes among SMEs transitioning from manual to digital information management.

5.4 Image-Based Import Feature

The image-based import feature produced a mean score of 2.46, which contrasts sharply with the positive results observed for the broader automation construct. This result should be treated as an area requiring further investigation and improvement rather than as evidence that automation as a whole is ineffective. Possible explanations for the low rating include limited user experience with the feature, infrequency of use, challenges related to image quality and document layout, and OCR recognition difficulties under suboptimal conditions (Nurminen et al., 2022).

The distinction between structured data import (such as Excel-based import) and unstructured data import (such as image-based OCR) is well-established in the information systems literature. Structured data import methods typically offer higher accuracy and reliability because they operate on predefined data formats, whereas OCR-based methods must contend with variability in image quality, font types, lighting conditions, and document layouts (Nurminen et al., 2022). The findings of this study empirically validate this distinction from the user perspective, suggesting that while image-based import holds theoretical promise for reducing manual data entry, its practical effectiveness in the examined SME context was perceived as limited. Software developers should therefore prioritize improving OCR accuracy, implementing robust validation mechanisms, and

providing clear user guidance to enhance the utility of image-based import features.

5.5 User Feedback and Suggested Improvements

The qualitative feedback provided by respondents complements the quantitative findings and offers practical direction for system improvement. Suggested enhancements included better monitoring of products approaching expiry, ability to add or update multiple stock records simultaneously, easier identification of business deficits, barcode generation capabilities, online and cloud-based operation, and mobile application support. These suggestions reflect evolving expectations among SME users regarding the functionality and accessibility of business management systems.

The suggestion for cloud-based and mobile operation is particularly noteworthy given the increasing prevalence of mobile technologies in business contexts. Alshamaila et al. (2013) found that cloud computing adoption by SMEs was influenced by factors including relative advantage, compatibility, and top management support. The respondent suggestions in this study suggest that SME users perceive significant relative advantages in cloud-based and mobile system capabilities, which could inform future system development priorities.

5.6 Theoretical Implications

The findings of this study provide empirical support for the Technology Acceptance Model and the Technology-Organization-Environment framework in the context of SME business management systems. The positive relationships observed between system features (automation, information quality, and accessibility) and operational outcomes (efficiency and decision-making) are consistent with TAM's proposition that perceived usefulness is a key determinant of technology acceptance and outcomes (Davis, 1989; Venkatesh & Davis, 2000). The findings also align with the TOE framework by demonstrating that technology characteristics (automation features, information quality) are

associated with operational outcomes in organizational contexts (Tornatzky & Fleischer, 1990).

Furthermore, the study contributes to the literature by providing empirical evidence for the specific relationships between automation and operational efficiency and between information quality and accessibility and decision-making within a computerized SME business management context. While previous studies have examined these relationships in broader contexts, the focused examination of inventory and business management systems provides a more granular understanding of how specific system features translate into perceived operational benefits.

5.7 Practical Implications

For SME owners and managers, the findings suggest that investments in computerized business management systems with robust automation features and high-quality information management capabilities can yield tangible improvements in operational efficiency and decision-making. However, the relatively low score for image-based import highlights the importance of evaluating individual system features rather than assuming that all automated functions are equally beneficial. Managers should consider conducting pilot evaluations of specific features before full-scale implementation and should solicit user feedback regularly to identify areas requiring improvement.

For software developers, the study provides actionable feedback regarding the design of inventory and business management systems. The positive reception of automation features overall suggests continued investment in streamlining routine tasks. However, the specific feedback on image-based import indicates a need for improved OCR accuracy, better error handling, and more intuitive user interfaces for this feature. Additionally, the suggestions for cloud-based operation, mobile applications, and barcode generation represent clear market demands that developers may wish to prioritize in future product roadmaps.

6. Conclusion

This study evaluated the effects of automation and information management on operational efficiency and decision-making in SME operations, using a computerized inventory and business management system as the practical context. Based on data from 103 valid questionnaire responses, the study concludes that automation is positively and significantly associated with operational efficiency. Automated processes can reduce repetitive manual activities and support more efficient handling of business information, as evidenced by the moderately strong positive correlation ($r = .644$) and the significant regression model ($R^2 = .415$) observed in the analysis.

The study also concludes that information quality and accessibility are strongly associated with business decision-making. Accurate, reliable, current, and accessible information can provide users with better support when making operational decisions, as evidenced by the strong positive correlation ($r = .702$) and the significant regression model ($R^2 = .492$). The decision-making construct recorded the highest mean score (4.14) among all measured constructs, indicating a generally positive perception among respondents regarding the system's contribution to their decision-making processes.

Overall, computerized information systems have an important role to play in SME operations. However, individual system features may perform differently in practice. The relatively low score recorded for image-based import (mean = 2.46) demonstrates the importance of continuously evaluating and improving specific automation functions rather than assuming uniform effectiveness across all features. This finding has direct implications for both system users and developers, highlighting the need for iterative improvement based on user feedback and empirical evaluation.

6.1 Recommendations

Based on the findings of this study, several recommendations are offered. First, image-based data import should be improved through better OCR

accuracy, enhanced validation mechanisms, and more robust error-handling procedures. Developers should consider implementing pre-processing steps to optimize image quality before OCR processing and should provide users with clear feedback when recognition errors occur. Second, future versions of the system should consider cloud-based operation and mobile application support, as suggested by respondents. These capabilities would enhance information accessibility and enable real-time decision-making from multiple locations. Third, a barcode generation feature may be considered for products that do not already have usable barcodes, as this would further streamline product registration and inventory management processes.

6.2 Limitations

The study has several limitations that should be acknowledged. First, the study relied primarily on respondents' perceptions rather than on direct measurement of business performance indicators such as task-completion time, data-entry error rates, or financial outcomes. Perceptual measures, while valuable for understanding user experiences, may not fully capture objective operational improvements. Second, the study focused on a specific computerized inventory and business management context and therefore may not generalize to every type of information system used by SMEs. Third, the image-import feature was evaluated based on respondents' perceptions, and additional technical testing would be required to determine its OCR accuracy under different image conditions. Fourth, the purposive sampling approach, while appropriate for the research objectives, may introduce selection bias by overrepresenting individuals with positive experiences or particular interest in the system.

6.3 Directions for Future Research

Future studies could extend this research in several directions. First, larger and more diverse SME samples could be used to enhance the generalizability of the findings. Second, researchers could compare manual and computerized processes using objective indicators such as actual task-

completion times and data-entry accuracy rates, complementing the perceptual measures used in this study. Third, the accuracy of OCR-based image import could be evaluated using controlled experiments with different image qualities, document formats, and lighting conditions. Fourth, the effects of cloud-based and mobile business management systems on SME operational efficiency and decision-making could be examined. Fifth, longitudinal research could investigate the long-term financial effects of automation and information management investments in SMEs. Finally, comparative studies examining different inventory management systems across multiple platforms and vendors would provide valuable insights for both practitioners and developers.

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