



EFFECT OF ELECTRONIC INVOICING ON THE SUPPLY CHAIN PERFORMANCE OF MAIZE MILLING FACTORIES IN MERU COUNTY, KENYA

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Article DOI: <https://doi.org/10.36713/epra28619>

DOI No: 10.36713/epra28619

ABSTRACT

Electronic invoicing has become an important digital procurement tool for improving efficiency and coordination in supply chain operations. This study examined the effect of electronic invoicing on the supply chain performance of maize milling factories in Meru County, Kenya. A descriptive survey design was adopted, targeting 40 procurement officers from the ten registered maize milling factories using a census sampling technique. Primary data were collected using structured questionnaires and analyzed using descriptive statistics and simple linear regression in SPSS version 29. The findings revealed that electronic invoicing was partially implemented, with stronger adoption in invoice approval than in invoice automation and system integration. Regression analysis established a significant positive relationship between electronic invoicing and supply chain performance ($R = 0.780$, $R^2 = 0.608$, $\beta = 0.352$, $p < 0.001$). The study concludes that enhanced adoption of electronic invoicing significantly improves supply chain performance and recommends greater automation and integration of invoicing systems with procurement and finance functions.

KEYWORDS: Electronic Invoicing, E-Procurement, Supply Chain Performance, Digital Procurement, Procurement Automation, Manufacturing Firms.

1.0 INTRODUCTION

Electronic invoicing has become an integral component of modern procurement and supply chain management, enabling organizations to replace traditional paper-based invoicing with digital systems that automate invoice generation, transmission, approval, and payment. By integrating procurement, finance, and supplier management functions, electronic invoicing improves the speed and accuracy of financial transactions while reducing administrative costs and manual intervention (Kimmons, 2017; LaMarco, 2018). The technology enhances transparency, minimizes invoice duplication and processing errors, and facilitates real-time validation of transactions, thereby improving coordination across the supply chain (Matano et al., 2020). As organizations increasingly embrace digital transformation, electronic invoicing has emerged as a strategic tool for improving operational efficiency and strengthening supply chain performance.

In the agro-processing sector, efficient procurement and financial processes are essential for maintaining uninterrupted production and timely delivery of products. Kenya's maize milling industry depends on effective coordination between suppliers, procurement units, finance departments, and distributors to ensure a continuous supply of raw materials and finished products. However, many milling firms continue to rely on manual invoicing processes that are characterized by delays, inaccuracies, and high transaction costs (Dwivedi et al., 2022; Mwangi, 2021). The adoption of electronic invoicing offers an opportunity to streamline invoice processing, improve supplier collaboration, and enhance supply chain performance through shorter procurement cycles, improved financial accuracy, and better information sharing (Waithaka & Kimani, 2021; Fatorachian & Kazemi, 2021). Nevertheless, empirical evidence on the effect of electronic invoicing on supply chain performance among maize milling factories in Kenya remains limited, creating the need for this study.

2.0 PAST STUDIES

Electronic invoicing refers to the electronic generation, exchange, processing, and storage of invoices through integrated digital systems that connect procurement, finance, suppliers, and customers. Unlike conventional paper-based invoicing, electronic invoicing enables organizations to automate invoice processing, reduce manual data entry, accelerate approvals, and improve transaction accuracy (Kimmons, 2017). According to LaMarco (2018), integrating electronic invoicing with financial and procurement systems enhances workflow efficiency by facilitating real-time invoice validation, electronic payments, and centralized record management. Similarly,



Matano et al. (2020) observed that organizations implementing electronic invoicing benefit from lower administrative costs, reduced processing time, improved data security, and enhanced visibility across supply chain operations, ultimately contributing to improved organizational performance. Several empirical studies have demonstrated the positive contribution of electronic invoicing to organizational and supply chain performance. Pattanayak and Punyatoya (2019) found that electronic invoicing improves business efficiency by standardizing invoice processing, reducing paperwork, and enhancing compliance with financial reporting requirements. Likewise, Waithaka and Kimani (2021) reported that electronic invoicing minimizes invoice duplication, prevents document loss, and reduces payment errors through secure electronic record management. Ilham et al. (2019) further established that electronic invoicing improves cash flow management and shortens payment cycles, leading to stronger supplier relationships and more responsive supply chains. While these studies provide evidence of the operational benefits of electronic invoicing, they largely focus on manufacturing, taxation, and public procurement contexts. Consequently, little empirical evidence exists on its effect on supply chain performance within Kenya's maize milling industry, particularly in Meru County, thereby justifying the current study.

3.0 MATERIALS AND METHODS

Description of the Study Area

Meru County was the study area. It is one of the 47 counties in Kenya, located in the Eastern region, and is actively involved in maize farming. The county borders Nyeri, Laikipia, Isiolo, and Tharaka Nithi counties. Meru County was selected because it is a major maize-producing county with a significant number of maize milling factories, making it an appropriate setting for examining the effect of electronic invoicing on supply chain performance. The study therefore focused on maize milling factories operating within Meru County..

Research Design and Sampling

The study adopted a descriptive survey research design to examine the effect of electronic invoicing on the supply chain performance of maize milling factories in Meru County, Kenya. A descriptive survey design is appropriate for collecting, describing, and analyzing data on existing phenomena and relationships without manipulating the study variables (Kothari, 2004). The design enabled the collection of quantitative data through structured questionnaires administered to procurement officers, providing insights into the adoption of electronic invoicing and its influence on supply chain performance.

The target population comprised procurement officers from the 10 registered maize milling factories operating in Meru County (Meru County SRA Report, 2022). Since the population was relatively small, the study employed a census sampling technique, where all eligible respondents were included in the study, as recommended by Kothari (2010) for small populations. Each maize milling factory was represented by four procurement officers, yielding a total sample size of 40 respondents. The census approach minimized sampling error and ensured comprehensive representation of procurement personnel involved in electronic invoicing and supply chain activities, thereby enhancing the reliability and generalizability of the study findings within the maize milling sector in Meru County.

Data Collection and Analysis

Primary data were collected from procurement officers of maize milling factories in Meru County using structured questionnaires administered through the drop-and-pick method. The study examined electronic invoicing practices, including invoice automation, processing efficiency, approval processes, error reduction, invoice tracking, and system integration, alongside supply chain performance indicators. Completed questionnaires were coded and analyzed using SPSS version 29. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the data, while inferential analysis using simple linear regression was employed to determine the effect of electronic invoicing (independent variable) on supply chain performance (dependent variable) (Kabacoff, 2022). The study used the following regression model:

$$Y = \beta_0 + \beta_i X_j + \varepsilon \dots \text{Where } (i = j) \dots (1)$$

Where: Y = Supply chain performance

β_0 = Constant

X_j = Electronic invoicing

ε = Error Term

β_i = Regression Coefficient

The variables were measured using multiple items rated on a 5-point Likert scale (1 = Strongly Disagree, 2= Disagree, 3 = Neutral, 4 = Agree to 5 = Strongly Agree).



4.0 RESULTS AND DISCUSSION

Descriptive findings on Electronic invoicing and Supply chain performance

The researcher was able to collect data from 40 procurement officers operating in various maize millers in Meru County and a 100% response rate achieved which gave room to proceed with analysis. The study assessed respondents' perceptions of electronic invoicing practices, including invoice automation, processing efficiency, approval processes, error reduction, invoice tracking, and system integration, and their contribution to supply chain performance.. The results are presented in Table 1.

Table 1. A Summary of Descriptive Findings on Electronic Invoicing Constructs

Electronic invoicing statements	Disagree n (%)	Neutral n (%)	Agree n (%)	Mean	SD
Invoicing in our organization is largely automated with minimal manual intervention.	35 (87.5%)	0 (0.0%)	5 (12.5%)	2.24	2.24
Electronic invoicing has reduced the time taken to prepare and submit invoices.	22 (55.0%)	3 (7.5%)	15 (37.5%)	2.76	2.76
Invoice approval processes are faster due to electronic invoicing.	5 (12.5%)	12 (30.0%)	23 (57.5%)	3.48	3.48
Electronic invoicing has reduced errors and invoice rejections.	10 (25.0%)	2 (5.0%)	28 (70.0%)	3.31	3.31
Electronic invoicing has minimized duplication and loss of invoices.	31 (77.5%)	7 (17.5%)	2 (5.0%)	2.28	2.28
Electronic invoicing is integrated with other departments such as finance and supply chain.	5 (12.5%)	20 (50.0%)	15 (37.5%)	3.24	3.24

Source: Research Data (2026)

The findings reveal mixed adoption of electronic invoicing among maize milling factories in Meru County. Invoice approval processes recorded the highest level of agreement, with 23 respondents (57.5%) agreeing that electronic invoicing had accelerated invoice approvals (Mean = 3.48, SD = 0.68). This suggests that electronic invoicing has improved workflow efficiency by reducing delays associated with manual approval processes. These findings support Matano et al. (2020), who reported that electronic invoicing streamlines approval workflows through real-time invoice validation and automated routing. In contrast, respondents generally disagreed that invoicing processes were largely automated, with 35 respondents (87.5%) indicating that substantial manual intervention still exists (Mean = 2.24, SD = 0.66). Similarly, 22 respondents (55.0%) disagreed that electronic invoicing had reduced invoice preparation and submission time (Mean = 2.76, SD = 0.94), suggesting that the anticipated efficiency gains have not been fully realized. These findings corroborate Kimmons (2017) and LaMarco (2018), who observed that the benefits of electronic invoicing are only fully achieved when invoice generation, transmission, and approval are completely digitized.

The findings further indicate that electronic invoicing has not been comprehensively integrated into supply chain operations. Although 28 respondents (70.0%) agreed that electronic invoicing had reduced invoice errors and rejections (Mean = 3.31, SD = 0.93), the mean score remained below the study benchmark of 3.4, indicating that respondents did not collectively perceive the practice as fully effective. Likewise, 31 respondents (77.5%) disagreed that electronic invoicing had minimized invoice duplication and loss (Mean = 2.28, SD = 0.52), while half of the respondents remained neutral regarding the integration of electronic invoicing with finance and supply chain departments (Mean = 3.24, SD = 0.64). These findings suggest that electronic invoicing has only been partially implemented, limiting its ability to deliver maximum supply chain benefits. The results are consistent with Pattanayak and Punyatoya (2019) and Waithaka and Kimani (2021), who contend that organizations realize the full benefits of electronic invoicing only when systems are fully integrated, automated, and supported by centralized digital record management. Overall, the findings imply that while electronic invoicing has improved invoice approval processes, maize milling factories in Meru County have yet to fully exploit its potential to enhance overall supply chain performance..

HYPOTHESIS TESTING

Hypothesis testing was conducted to determine whether electronic invoicing significantly influences supply chain performance among maize milling factories in Meru County. The null hypothesis (H_0) stated that there is no significant relationship between electronic invoicing and supply chain performance. Bivariate regression analysis, $Y = \beta_0 + \beta_1 X + \epsilon$, was used to test the hypothesis. The decision criterion was based on the p-value at the 5% level of significance, whereby the null hypothesis was rejected if the p-value was less than 0.05 and retained otherwise.

Bivariate Regression Results

The results of the bivariate regression model presented in Table 2 indicate that electronic invoicing has a significant positive influence on supply chain performance among maize milling factories in Meru County.

Table 2. Model Summary, ANOVA and Regression Results for Electronic Invoicing

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
1	0.780 ^a	0.608	0.563	0.8975		
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	5.037	1	5.037	58.95	.000 ^b
	Residual	3.251	38	0.086		
	Total	8.288	39			
		Unstandardized Coefficients		Standardized Coefficients	t	p-value
		B	Std. Error	Beta		
(Constant)		2.695	0.857	—	3.146	0.003
Electronic invoicing		0.352	0.046	0.780	7.678	0.000

Source: Research Data (2026)

- Predictors: (Constant), Electronic Invoicing
- Dependent Variable: Supply Chain Performance

The model summary shows a correlation coefficient of $R = 0.780$, indicating a strong positive relationship between electronic invoicing and supply chain performance. The R Square value of 0.608 indicates that electronic invoicing explains 60.8% of the variation in supply chain performance, while the remaining 39.2% is explained by other factors not included in the model. The Adjusted R Square of 0.563 suggests that, after adjusting for sample size, electronic invoicing still explains a substantial proportion of the variation in supply chain performance. The ANOVA results ($F = 58.950$, $p = 0.000$) further confirm that the regression model is statistically significant.

The regression coefficient for electronic invoicing was positive and statistically significant ($B = 0.352$, $\beta = 0.780$, $t = 7.678$, $p = 0.000$), indicating that improvements in electronic invoicing are associated with improvements in supply chain performance. Specifically, a one-unit increase in electronic invoicing leads to an estimated 0.352-unit increase in supply chain performance. Since the p-value is less than the 0.05 significance level, the study rejects the null hypothesis (H_{01}) and concludes that electronic invoicing has a statistically significant positive effect on supply chain performance among maize milling factories in Meru County.

Using the unstandardized beta coefficients in Table 2, the overall equation for the regression model can be given as follows:

$$Y = 2.695 + 0.352X \dots\dots\dots(3)$$

where Y represents supply chain performance and X represents electronic invoicing.

The regression model indicates that, even in the absence of electronic invoicing, maize milling factories would attain a baseline supply chain performance score of 2.695. The positive regression coefficient demonstrates that strengthening electronic invoicing practices through greater automation of invoice processing, reduced manual intervention, improved invoice accuracy, and better integration with finance and procurement systems significantly enhances supply chain performance. Although 39.2% of the variation in supply chain performance is attributable to other organizational and environmental factors, the relatively high coefficient of determination ($R^2 = 0.608$) indicates that electronic invoicing is a major determinant of supply chain performance. These findings are consistent with Waithaka and Kimani (2021), who reported that electronic invoicing minimizes manual processing, reduces transaction errors, shortens processing cycles, and improves coordination across the supply chain, thereby enhancing overall organizational performance.

5.0 CONCLUSION AND RECOMMENDATIONS

Conclusions

The study concludes that electronic invoicing has a significant and positive effect on supply chain performance among maize milling factories in Meru County. Electronic invoicing explained 60.8% of the variation in supply chain performance and significantly improved operational efficiency through faster invoice processing, reduced errors, and enhanced coordination across procurement and finance functions. The findings demonstrate that greater adoption and integration of electronic invoicing systems contribute to improved supply chain performance.

**Recommendations for Practice**

Maize milling factories should strengthen the adoption of electronic invoicing by automating invoice processing and integrating invoicing systems with procurement, inventory, and finance functions. Management should also invest in staff training and digital infrastructure to minimize manual interventions, improve transaction accuracy, and enhance overall supply chain efficiency.

Recommendations for Further Research

Since electronic invoicing accounted for 60.8% of the variation in supply chain performance, future studies should investigate other factors that may influence supply chain performance, such as electronic tendering, electronic payment, electronic customer relationship management, organizational readiness, technological capability, and regulatory support. Further studies may also consider other manufacturing sectors or counties to enhance the generalizability of the findings.

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