EFFECT OF ELECTRONIC DATA INTERCHANGE INTEGRATION ON SUPPLY CHAIN PERFORMANCE OF SUGAR MANUFACTURING FIRMS IN KENYA

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ABSTRACT

KEYWORDS:

Relationship, Manufacturing, Performance, Integration

In Kenya, there has been a challenge on cost of manufacturing. At the same time, there has been a decrease in sugar cane production from 6.7 million tons in 2013 to 6.5 million tons in 2014 as reported in Economic Survey done in 2014. Moreover, despite reporting increased cane delivery in 2015, value addition by the sugar firms remained dismal indicating inefficient firm processes and overall poor performance. This has been attributed to high cost of production. Its argued that supply chain (SC)s may use Electronic data interchange integration(EDII) to mitigate on cost which in turn can improve firm performance. The objective of the study was to established the effect of electronic data interchange integration on supply chain performance. This study was anchored on resource based theory. This study used correlation research design. The target population was 300 supply chain employees from the 10 sugar manufacturing firms in western Kenya. A sample size of 169 was drawned using cluster, purposive and simple random sampling. Structured and semi structured questionnaire and interview guide was used to collect primary data. Secondary data on the other hand was obtained from the company's records. Multiple, regression analysis established that that all the four EDI practices, e-sourcing (= 0.170, p<0.05); e-invoicing (= 0.255, p<0.05), e-ordering (= 0.208, p<0.05), and e-payment (= 0.264, p<0.05) were positive and significant predictors of supply chain performance. On the basis of the t-values, e-payment (t = 3.111) had the larger impact on supply chain performance, followed by e-invoicing (t=2.986); e-ordering (t = 2.885), and e-sourcing (t=2.202) respectively. The study concluded that Electronic data interchange integration has an effect on supply chain performance and therefore the null hypothesis was rejected. The study recommended that stakeholders should embrace integration of EDI since it improves performance of the sugar industry.

1.INTRODUCTION

Electronic data interchange integration (EDII) is the movement of data electronically across firms. It's the computer-to-computer exchange of business documents between companies. [1] Advances that it is the standardized electronic format for communication between business partners, through computer-to-computer & cloud based exchange. According to [2], Electronic Data Interchange (EDI) is defined as the movement of business data electronically between or within firms including their agents or intermediaries. EDI documents use specific computer record formats that are based on widely accepted standards. However, each company will use the flexibility allowed by the standards in a unique way that fits their business needs. The exchange such as, E-sourcing E-invoicing, E-ordering, E-payment, and supports various business transactions taking place within and without firms.

The extent of adoption, advantages and problems ensuing from a no adoption decision need to be assessed. For nearly two decades, electronic data interchange (EDI) has been widely viewed as a technology pivotal to supply chain management that has also provided benefits to terms on multiple levels. According to [2] EDI continues to prove its major business

value by lowering costs, improving speed, accuracy and business efficiency. The greatest EDI benefits often come at the *strategic* business level. According to a recent research study from [1], EDI continues to prove its worth as an electronic message data format. This research states that "the annual volume of global EDI transactions exceeds 20 billion per year and is still growing. For buyers that handle numerous transactions, using EDI can result in millions of dollars of annual savings due to early payment discounts. From a financial perspective alone, there are impressive benefits from implementing EDI. Exchanging documents electronically improves transaction speed and visibility while decreasing the amount of money you spend on manual processes. But cost savings is far from the only benefit of using EDI.

2.OBJECTIVE OF THE STUDY

The objective of the study was to establish the effect of electronic data interchange integration on supply chain performance of sugar manufacturing firms in Kenya

HYPOTHESIS OF THE STUDY

$H0_1$: Electronic data interchange integration has no affect on supply chain performance of sugar manufacturing firms in Kenya

METHODOLOGY
3.1 Introduction

This section sets out various stages and phases that were followed in completing the study. It involved a blueprint for the collection, measurement and analysis of data. This section is an overall scheme, plan or structure conceived to aid the researcher in answering the raised research question.The section identified the procedures and techniques that were used in the collection, processing, and analysis of data. Research design, target population, data collection instruments, data collection procedures and data analysis and presentations are spelt out here.

3.2 Research Design

The study adopted co relational research design which, according to Kothari (2014), was structured to examine the cause and effect situation within organizations. Kothari argues that explanatory research design allows for both quantitative and qualitative data and consequent analysis.

3.3 Study Area

This study was conducted in western Kenya. In this study, Western Kenya is defined by the current administrative counties of Kisii, Nyamira, Migori, Kisumu, Homabay, Siaya, Bungoma, Kakamega, Vihiga and Busia. The area was chosen since it contained the highest concentration of sugar firms and is a large sugarcane farming belt. It is also the region where the head office of sugarcane development research initiative, KESREF is located.

3.4 Target Population

The target population was 300 Supply Chain officers of the10 sugar manufacturing companies. Supply chain officers were chosen because of their ability to articulate issues of electronic data interchange integration, supplier relationships and supply chain performance. The population was distributed as in table 3.0

Table 3.0 Population Distribution

No	Rank name of manufacturing	Supply chain staff (population)	Proportion	Sample
1	Mumias Sugar Company	47	(47/300)*169	26
2	West Kenya Sugar Limited	30	(30/300)*169	17
3	Nzoia Sugar Factory	31	(31/300)*169	17
4	South Nyanza Sugar Co.	45	(45/300)*169	25
5	Transmara Sugar Company	19	(19/300)*169	11
6	Butali Sugar Mills	23	(23/300)*169	13
7	Sukari Industries Limited	17	(17/300)*169	10
8	Kibos Sugar and Allied Industries Ltd	20	(20/300)*169	11
9	Muhoroni Sugar Company	33	(33/300)*169	19
10	Chemelil Sugar Factory	35	(35/300)*169	20
	Total	300		169

3.5 Sample Size and Sampling Technique

3.5.1 Sample Size

The sample size was 169 staff members obtained as per Krejcie and Morgan (1970) (See appendix I). The sample distribution is shown in the table 3.1

Table 3.1 Population and Sample Distribution

No	Sugar Firm	Number of Supply Chain Officers	Proportion	Sample Size
1	Mumias Sugar Company	47	(47/300)*169	26
2	West Kenya Sugar Limited	30	(30/300)*169	17
3	Nzoia Sugar Factory	31	(31/300)*169	17
4	South Nyanza Sugar Co.	45	(45/300)*169	25
5	Transmara Sugar Company	19	(19/300)*169	11
6	Butali Sugar Mills	23	(23/300)*169	13
7	Sukari Industries Limited	17	(17/300)*169	10
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9	Muhoroni Sugar Company	33	(33/300)*169	19
10	Chemelil Sugar Factory	35	(35/300)*169	20
	Total	300		169

3.5.2 Sampling Technique

Cluster sampling was adopted where each firm represented a cluster. This was to enable the sample to be representative of each firm. Purposive sampling was used to pick all the staff at managerial level within the supply chain to be part of the sample. Simple random sampling was then used to pick the remaining respondents from the population from each firm.

3.6 Data Collection

3.6.1 Data Type and Source

Both primary and secondary data were used. Data in qualitative and quantitative form was expected. Primary data was obtained from respondents' involved and secondary data from relevant documents in the custody of the firms and other institutions such as KESREF.

3.6.2 Data Collection Instrument

Primary data was collected using self administered structured and semi structured questionnaire. Interview guide was also used to collect data from key informants. Secondary data was collected through document review.

3.6.3 Instrument Validation and Reliability Test

Validity and reliability was tested on the pilot data from 10 respondents. Reliability was obtained from Cronbach's alpha analysis at e" 0.7.0 Convergent and discriminant validity was confirmed from reliability values, face, constructs and translation validity was confirmed by experts and practitioners

3.7 Data Analysis and Presentation

Data was analyzed using descriptive and inferential statistics. Means, percentages, frequencies and standard deviation was used to describe data. Multiple regression analysis was conducted to obtain results for objective one, simple regression analysis was used to obtain results for the objective two and Moderator regression analysis was done to obtain results for objective three.

3.7.1 Model

- A. Objective 1 (Multiple regression analysis)
- B. To establish effect of electronic data interchange integration on supply chain performance

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + e_i \dots\dots\dots\dots\dots\dots (i)$$

Where β_0, 1, 2, 3, 4–are constants to be determined

Y_i- Supply Chain Performance

X_{1i}- E-sourcing

X_{2i}- E-invoicing

X_{3i}- E-ordering

X_{4i}- E-payment

e_i- Error term assumed to be normally distributed with a mean of zero and constant variance

RESULTS

4.1 Results of the effect of Electronic Data Interchange Integration on Supply Chain Performance

The first null hypothesis H_01 presupposed that electronic data interchange had no effect on supply chain performance of sugar manufacturing firms in western Kenya. Regressing supply chain Performance on the four EDI practices revealed that variations in the EDI practices explained up to 55.1% of the variation in supply chain performance (Table 4.17)

Table 4.17
Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.742[a]	.551	.539	.42228	1.994

a. Predictors: (Constant), EPAY, ESOUR, EORD, EINV
b. Dependent Variable: PERF

Moreover, the significant F static ($F_{4, 147} = 45.143$, p<0.05) indicates that the conceived regression model relating supply chain performance to EDI practices was statistically adequate (Table 4.18).

Table 4.18
ANOVAᵃ

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	32.200	4	8.050	45.143	.000ᵇ
	Residual	26.213	147	.178		
	Total	58.413	151			

a. Dependent Variable: PERF
b. Predictors: (Constant), EPAY, ESOUR, EORD, EINV

The multiple regression weights (Table 4.19) affirmed that all the four EDI practices, e-sourcing (= 0.170, p<0.05); e-invoicing (=0.255, p<0.05), e-ordering (=0.208, p<0.05), and e-payment (= 0.264, p<0.05) were positive and significant predictors of supply chain performance. On the basis of the t-values, e-payment (t = 3.111) had the larger impact on supply chain performance, followed by e-invoicing (t=2.986); e-ordering (t = 2.885), and e-sourcing (t=2.202) respectively.

Table 4.19
Coefficientsᵃ

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	.335	.278		1.202	.231		
	ESOUR	.155	.071	.170	2.202	.029	.509	1.963
	EINV	.285	.096	.255	2.986	.003	.417	2.397
	EORD	.209	.072	.208	2.885	.005	.585	1.710
	EPAY	.258	.083	.264	3.111	.002	.424	2.356

a. Dependent Variable: PERF

The implication of the regression weights is that holding other practices constant, a 1 standard deviation increase in e-sourcing can occasion a 0.170 standard deviations increase in supply chain performance; similarly, holding other practices constant a 1 standard deviation increase in e-invoicing results in 0.255 standard deviations increase in supply chain performance; 1 standard deviation increase in e-ordering leads to a 0.208 standard deviations increase in supply chain performance when other practices are held constant, and a 1 standard deviations increase in e-payment occasions a 0.264 standard deviations increase in supply chain performance as long as other practices are held constant

4.2 Discussion of the Findings

The finding that e-ordering positively and significantly affects performance of sugar manufacturing firms in western Kenya is indeed consistent with discourse that points to the positives gained from online ordering. According to [7], benefits of online ordering surpasses increased sales; [7] argues that through online ordering, customers too have an opportunity to among other benefits, place orders at their convenience, check order status at any time, and receive correct orders in timely manner. The findings showing that, sugar manufacturing firms in western Kenya regard order processing, selection and picking highly is therefore, a crucial cog in the endeavor to improve the supply chain ordering component.

The findings that e-payment offers the largest impact on supply chain performance was not surprising. Evidence in extant literature identifies e-payment as a system that has gained popularity in relation to the simplification of payments and financial transactions [8]. Indeed the discovery in the present study rating e-payment in sugar firms as being high in terms of reduction of transaction time, and in reducing transactions risk backs others [9]. [9] Concur that the e-payment system significantly cuts transaction time, and more importantly reduces risk of loss and theft. Consequently, the results showing that the sugar firms may not be performing well cannot be attributed to e-payment.

It is prudent therefore, to argue that integration of EDI in sugar manufacturing firms in western Kenya can reap massive operational and strategic benefits when they fully commit to integrating the key practices of EDI. Previous studies have noted that companies that have integrated EDI have realized handsome benefits [10]

5.1 CONCLUSION

The study concluded that Electronic data interchange integration has an effect on supply chain performance and therefore the null hypothesis was rejected.

5.2 RECOMMENDATION

The study recommended that stakeholders should embrace integration of EDI since it improves performance of the sugar industry.

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