

ELECTRONIC DATA INTERCHANGE AND BUSINESS SUCCESS OF SUPERMARKETS IN PORT HARCOURT

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Abstract

This study investigated the correlation between electronic data interchange (EDI) and business success of supermarkets in Port Harcourt. The study conceptualized EDI as predictor to business success measures of service speed, system reliability and cost minimization. The study adopted a cross sectional research design with a correlational investigation type. The study population comprised 35 registered supermarkets in Port Harcourt. The researcher adopted a Census method and administered 3 copies of structured questionnaire to Operations Manager, Inventory Manager and Procurement Manager of each of the 35 supermarkets. This means that a total of 105 respondents were used for the study. The reliability of the instrument was achieved by the use of the Cronbach Alpha coefficient with all the items scoring above 0.70. Data was collected through structured questionnaire that was designed in Likert 5-point scale. Pearson's Product Moment relationship (PPMC) was used in testing the various hypotheses with the help of the Statistical Packages for Social Sciences Version 25.0. From the analysis of data, it was revealed that EDI had a significant correlation with business success. Based on these findings, the study concluded that EDI significantly relates with business success of supermarkets in Port Harcourt. The study therefore recommends that managers of supermarkets in Port Harcourt should ensure availability of EDI system to help their businesses minimize transactional errors by eliminating manual data entry, ensure greater accuracy in order processing and inventory management, accelerate transaction processing times, track orders, shipments, and inventory levels in real time, improve demand forecasting and reducing stockout leading to business success.

Keywords: Business success, cost minimization, electronic data interchange, service speed, system reliability

Introduction

In today's dynamic business environment, the integration of digital technologies has become imperative to enhancing operational efficiency and competitiveness. One such technology that has revolutionized business transactions is Electronic Data Interchange (EDI), a system that facilitates electronic exchange of documents between organizations in a standardized format (Atanafu & Balda, 2018). EDI enhances communication, streamlines supply chain operations, reduces transactional errors and improves overall efficiency. As supermarkets operate in a highly competitive and fast-paced retail sector, the adoption of EDI is increasingly becoming a necessity for managing supplier relationships, inventory control and customer service.

The retail industry, particularly supermarkets, is characterized by high transaction volumes, complex supply chain networks, and a growing demand for efficiency and accuracy in business processes (De-Kok, 2018). In Port Harcourt, where supermarkets serve a diverse and expanding consumer base, the need for seamless, real-time and automated data exchange has never been more critical. EDI usage in supermarkets can facilitate quick order processing, accurate inventory management, improved supplier collaboration, and reduced administrative costs.

However, despite its potential benefits, the extent of EDI adoption among supermarkets in Port Harcourt and its actual impact on success remain underexplored.

Supermarkets in face challenges related to manual transaction processing, inventory discrepancies, delays in supply chain communication, and inefficiencies in order fulfillment, all of which can hinder operational effectiveness and customer satisfaction. EDI has been widely recognized for its role in improving supply chain integration and reducing transaction costs, its adoption and effectiveness among supermarkets in Port Harcourt has not been thoroughly examined. Additionally, technology adoption barriers, cost implications and lack of expertise further complicate the successful implementation of EDI (Delen et al., 2007).

There is paucity of theoretical and empirical research on the role of EDI in business success in the Port Harcourt retail business context. Previous researches on EDI usage and business success do not provide adequate knowledge for managers in the Nigerian context on how EDI usage affects a firm's success. This is because most of such studies are foreign (Atnafu & Balda, 2018; De-Kok, 2018). Besides, since knowledge is colossal and never ending, this study sought to expand knowledge in this area by examining the relationship between EDI usage and business success of supermarkets in Port Harcourt.

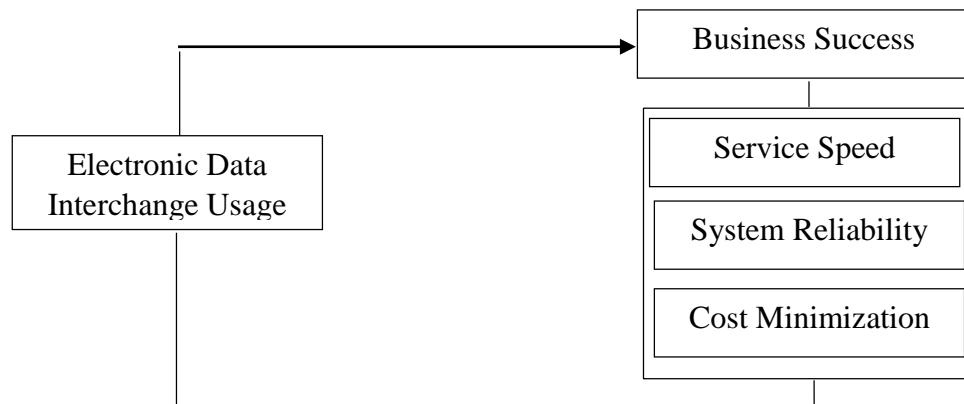


Fig. 1: Conceptual framework of relationship between electronic data interchange usage and business success of supermarkets in Port Harcourt.

Source: Adopted from Abdinasir (2020).

Baseline Theory

This study was underpinned by diffusion of innovations (DOI) theory (Rogers 1962) which explains how, why, and at what rate a new idea or technology spread within and among cultures (Abdinasir, 2020). The central focus of DOI theory is understanding the process through which an innovation is communicated over time among members of a social system. Rogers (1962) identify five elements that influence diffusion process: the innovation itself, communication channels, the time it takes for adoption, the social system within which the innovation is introduced, and the adopters who decide whether to embrace the innovation (Abdinasir, 2020).

Also, DOI theory group adopters into five categories: innovators, early adopters, early majority, late majority, and laggards. It also emphasizes the role of relative advantage, compatibility, complexity, trialability, and observability as factors that influence decision to adopt an innovation. In this study DOI theory offers valuable insights into the adoption process of EDI systems by supermarkets. As a technological innovation, EDI's adoption depend on how supermarkets perceive its relative advantage (e.g., faster transactions, cost reduction, improved inventory management), its compatibility with existing processes, and how easily it can be integrated into their operations (Atnafu & Balda, 2018).

DOI theory explain how different supermarkets may use EDI to enhance operational efficiency, leading to success (Chuang, 2017). By examining how supermarkets adopt and implement EDI based on these factors, DOI theory provides a framework for understanding the relationship between EDI usage and success, as successful adoption of innovation can improve communication, reduce errors, and enhance supermarket's competitive edge, thereby improving overall performance and profitability.

Concept of Electronic Data Interchange Usage

EDI is a structured method for electronically transmitting business documents such as purchase orders, invoices, and shipping notices between trading partners (Laudon & Laudon, 2020). EDI replaces traditional paper-based transactions with standardized, automated process that enhances accuracy, speed, and efficiency in business operations (O'Brien & Marakas, 2019; Chuang, 2017). Its adoption is particularly crucial in industries with complex supply chains, such as retail and supermarket operations, where real-time data exchange is essential for inventory management, order processing, and supplier coordination.

EDI is also seen as a digital communication system that enables automated exchange of documents between businesses, thereby eliminating manual processing and reducing transaction errors (Evwiekpae & Yusuf, 2021). Adoption of EDI offer significant advantages across various business functions, particularly in enhancing operational efficiency, reducing costs, and improving supply chain coordination. Firstly, EDI minimizes transactional errors by eliminating manual data entry, ensuring greater accuracy in order processing and inventory management.

Secondly, it accelerates transaction processing time, as electronic exchanges occur within seconds compared to days required for traditional paper-based methods. Thirdly, EDI enhances supply chain visibility, allowing supermarkets and suppliers to track orders, shipments, and inventory levels in real time, thereby improving demand forecasting and reducing stockouts (Evwiekpae & Yusuf, 2021). Fourthly, EDI contribute to cost savings by reducing expenses related to printing, mailing, and document storage. Finally, it enhances business relationships and competitiveness by fostering seamless collaboration between trading partners, leading to improved service delivery and customer satisfaction.

In summary, EDI usage has become a critical tool for modern businesses seeking efficiency and competitiveness in an increasingly digitalized marketplace. Its ability to facilitate real-time, error-free, and cost-effective transactions makes it an indispensable technology, particularly for supermarkets and retail firms that rely on efficient supply chain management (Govindan et al., 2018). As organizations continue to embrace digital transformation, understanding and leveraging EDI can significantly enhance business operations, streamline communication, and improve overall success.

Business Success

Business success is a concept that represents the achievement of both short-term goals and long-term business objectives. The success of an organization is often measured by its ability to achieve profitability, maintain a competitive advantage and adapt to the ever-changing business environment. Richard et al. (2009) define success as the accomplishment of business objectives that result in enhanced profitability, market share, and sustained competitive advantage. Kaplan and Norton (2001) expanded this view by emphasizing the importance of strategic goals that enhance both profitability and the ability to meet customer and stakeholder needs.

Cameron (2009), however, presents a more holistic view, suggesting that success is defined by a combination of organizational effectiveness, stakeholder satisfaction, and ability to adapt to external changes. This study adopts service speed, system reliability and cost minimization as measures of business success.

Service speed a crucial concept in modern service-based industries, referring to the efficiency with which services are delivered to customers. Service speed refers to the promptness with which services are delivered to customers, which is often linked to overall service quality and customer satisfaction. It relates to an organization's ability to deliver services quickly while maintaining a high level of customer satisfaction.

System reliability refers to the probability that a system will perform its intended function without failure over a specified period of time under normal operating conditions. System reliability is the measure of the likelihood that a system or its components will function without failure under specified conditions for a given period of time. This definition emphasizes the probabilistic nature of reliability and its focus on preventing failures through proper maintenance and system design.

Cost minimization is a strategic objective that seeks to reduce the expenses incurred in the production or delivery of goods and services while maintaining or improving the quality and efficiency of operations. Cost minimization involves finding the optimal allocation of resources to produce a given level of output at the lowest possible cost, achieved through efficient production techniques and resource management. It is a competitive advantage strategy where firms focus on becoming the low-cost producer in their industry, which allows them to undercut competitors on price or achieve higher profitability with similar pricing strategies.

Electronic Data Interchange and Business Success

Crooks and Haddud (2025) investigated how RFID technology enhance competitive advantage within the pharmaceutical supply chain and identified implementation barriers and solutions. The results show that RFID technology has the potential to improve competitive advantage by reducing costs and enhancing reliability, with budget and project management addressing the financial barriers.

Ogbewele et al. (2024) reviewed best practices for efficient pharmaceutical inventory management, emphasizing the integration of data analytics and predictive models to forecast demand, reduce waste, and streamline procurement. It explored strategies for implementing unified inventory systems across diverse healthcare settings, balancing cost efficiency with uninterrupted drug availability. Additionally, the paper examined the impact of global supply chain disruptions on pharmaceutical supply and recommends solutions for building resilience. Through real-world examples and recommendations for future improvements, this Ogbewele et al. (2024) highlights the potential for enhanced RFID as a global inventory management practices to reduce costs while ensuring the continuous availability of essential medications.

Ferdousmou et al. (2024) studied RFID as a pivotal technology in supply chain management. The study found that RFID significantly enhances efficiency and effectiveness. When integrated with the Internet of Things (IoT) to form RFID-IoT, this technology brings transformative advancements to supply chain management, enabling automated sensing, pervasive computing, and ubiquitous data access across the entire supply chain, from manufacturers and distributors to retailers and consumers.

Nwador et al. (2022) investigated e-tracking and service performance of pharmaceutical firms in Port Harcourt. The study found that GPS tracking system has strong positive influence on

both reliability and customer assurance. Also, that RFID significantly influences reliability and customer assurance. Relatedly, Kubáňová et al. (2022) examined implementation of barcode technology to logistics process of a company focusing on expanding the use of barcode in selected logistics activities. The result established that barcodes have less user errors and it was chosen above RFID because it was an already known work technology that organizations adopt to improve logistics performance.

Also, Patel and Patel (2021) explored how to enhance supply chain performance with RFID technology. This study carries out a systematic literature review of research articles published during the timeline (2000-2021) that discuss the role of RFID technology in developing decision support systems that optimize supply chains in light of Industry 4.0. The study found that RFID technology enhances supply chain performance. Based on the empirical review, the researcher hypothesizes as follows:

H₀₁: There is no significant relationship between EDI and service speed of supermarkets in Port Harcourt.

H₀₂: There is no significant relationship between EDI and system reliability of supermarkets in Port Harcourt.

H₀₃: There is no significant relationship between EDI and cost minimization of supermarkets in Port Harcourt.

Methodology

This study adopted a cross-sectional research design with a correlational type of investigation. The study population comprised 35 registered supermarkets in Port Harcourt, which are also registered with finelib.com. The researcher adopted a Census method and administered 3 copies of structured questionnaire to operations manager, inventory manager and procurement manager of each of the 35 supermarkets. This means that a total of 105 respondents were used for the study. The reliability of the instrument was achieved by the use of the Cronbach Alpha test with all the items scoring above 0.70. Data for the study was collected through primary source. Pearson's Product Moment Correlation was used to test the hypotheses with the aid of the Statistical Packages for Social Science, version 25.0.

Table 1: Reliability Coefficients of Variable Measures

S/N	Dimension/Measure	No. of Item	Cronbach Alpha
1	Electronic Data Interchange	4	0.91
2	Service Speed	4	0.81
3	System Reliability	4	0.87
4	Cost Minimization	4	0.85

Source: Survey Data, 2025

As shown in Table 1, the results of the Cronbach's alpha analysis revealed that all the variables in the study produced high Cronbach's Alpha coefficients indicating that, there is inter-item consistency among the variables in the study. This means that, if this study is conducted again in similar condition, the results would be similar to the results of our study.

Data Analysis and Findings

Table 2: Descriptive Statistics of Electronic Data Interchange

	N	Sum	Mean	Std. Dev.	Variance
Information exchange is consistent in terms of network in this organization	92	322	3.50	.734	.538
Data linkage is coherent across various units in this organization	92	320	3.48	1.200	1.439
Data transfers are more efficient and supportive of inventory related practices	92	379	4.12	1.175	1.381
Valid N (listwise)	92				

Source: SPSS Output, 2025.

Table 2 depicts high mean scores of the questionnaire items ranging over 3.00, this means that greater number of the respondents expressed very high and high extents of acceptance to the research question with respect to electronic data interchange. However, it can be seen that question 3 which sought to determine the extent to which data transfers are more efficient and supportive of inventory related practices among supermarkets in Port Harcourt, has the highest mean score of 4.12. This shows that question 3 has the strongest influence on the variables.

Table 3: Descriptive Statistics of Service Speed

	N	Sum	Mean	Std. Dev.	Variance
We are time conscious	92	349	3.79	1.339	1.792
We avoid procrastination	92	379	4.12	.660	.436
We deliver up to date information	92	402	4.37	.835	.697
Valid N (listwise)	92				

Source: SPSS Output, 2025.

Table 3 depicts high mean scores of the questionnaire items ranging over 3.00, this means that greater number of the respondents expressed very high and high extents of acceptance to the research question with respect to service speed. However, it can be seen that question 3 which sought to determine the extent to which supermarkets in Port Harcourt deliver up to date information, has the highest mean score of 4.37. This shows that question 3 has the strongest influence on the variables.

Table 4: Descriptive Statistics of Service Reliability

	N	Sum	Mean	Std. Dev.	Variance
We enjoy hitch free operations.	92	353	3.84	1.409	1.984
We are dependable	92	307	3.34	1.151	1.325
Our operations are unique	92	333	3.62	.993	.986
Valid N (listwise)	92				

Source: SPSS Output, 2025.

Table 4 depicts high mean scores of the questionnaire items ranging over 3.00, this means that greater number of the respondents expressed very high and high extents of acceptance to the research question with respect to service reliability. However, it can be seen that question 1 which sought to determine the extent to which supermarkets in Port Harcourt enjoy hitch free operations, has the highest mean score of 3.84. This shows that question 1 has the strongest influence on the variables.

Table 5: Descriptive Statistics of Cost Minimization

	N	Sum	Mean	Std. Dev.	Variance
Our firm records low operations cost.	92	390	4.24	.761	.580
When we reduce cost, profit is maximized in our firm	92	330	3.59	1.140	1.300
We avoid costs not associated with stock value	92	312	3.39	.877	.768
Valid N (listwise)		92			

Source: SPSS Output, 2025.

Table 5 depicts high mean scores ranging over 3.00, on items on cost minimization. This means that more respondents expressed very high and high extents of acceptance to the items with respect to cost minimization. However, it can be seen that question 1 which sought to determine the extent to which supermarkets in Port Harcourt record low operations cost, has the highest mean score of 4.24. This shows that item 1 is the most visible manifestation of cost minimization.

Table 6: Relationship between Electronic Data Interchange and Service Speed

		Electronic Data Interchange	Service Speed
Electronic Data Interchange	Pearson Correlation	1	.629**
	Sig. (2-tailed)		.000
	N	92	92
Service Speed	Pearson Correlation	.629**	1
	Sig. (2-tailed)	.000	
	N	92	92

**. Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS Output, 2025.

Table 6 reveals a correlation coefficient of 0.629** between EDI and service speed, indicating a strong positive relationship between EDI and service speed. More so, the probability value (0.000) is less than the critical value (0.05), this shows that there is a strong significant relationship between EDI and service speed. This further implies that EDI can be used to achieve service speed among supermarkets in Port Harcourt. Based on this, we reject the null hypothesis that there is no significant relationship between EDI and service speed of supermarkets in Port Harcourt.

7: Relationship between Electronic Data Interchange and Service Reliability

		Electronic Data Interchange	Service Reliability
Electronic Data Interchange	Pearson Correlation	1	.824**
	Sig. (2-tailed)		.000
	N	92	92
Service Reliability	Pearson Correlation	.824**	1
	Sig. (2-tailed)	.000	
	N	92	92

**. Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS Output, 2025.

Table 7 reveals a correlation coefficient of 0.824** between EDI and service reliability, indicating a very strong positive relationship between EDI and service reliability. More so, the probability value (0.000) is less than the critical value (0.05), this shows that there is a very strong significant relationship between EDI and service reliability. This further implies that EDI can be used to achieve service reliability among supermarkets in Port Harcourt. Based on

Table 8: Relationship between Electronic Data Interchange and Cost Minimization

		Electronic Data Interchange	Cost Minimization
Electronic Data Interchange	Pearson Correlation	1	.649**
	Sig. (2-tailed)		.000
	N	92	92
Cost Minimization	Pearson Correlation	.649**	1
	Sig. (2-tailed)	.000	
	N	92	92

**. Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS Output, 2025.

Table 8 reveals a correlation coefficient of 0.649** between EDI and cost minimization, indicating a strong positive relationship between EDI and cost minimization. More so, the probability value (0.000) is less than the critical value (0.05), this shows that there is a strong significant relationship between EDI and cost minimization. This further implies that EDI can be used to achieve cost minimization among supermarkets in Port Harcourt. Based on this, we reject the null hypothesis that there is no significant relationship between EDI and cost minimization of supermarkets in Port Harcourt.

Discussion of Findings

The study revealed that a strong positive correlation between EDI and service speed, a very strong positive correlation between EDI and service reliability, and is a strong positive correlation between EDI and cost minimization. More so, the probability value (0.000) of all the tests is less than the critical value (0.05), this shows that there is a strong significant relationship between EDI and measures of business success.

These findings corroborate with Crooks and Haddud (2025) that RFID technology enhance competitive advantage within the pharmaceutical supply chain. Similarly, the present findings support the findings of Ogbewele et al. (2024) which highlighted the potential for enhanced RFID as a global inventory management practices to reduce costs while ensuring the continuous availability of essential medications.

Also, the current findings are in line with the findings of Ferdousmou et al. (2024) that RFID significantly enhance efficiency and effectiveness; Nwador et al. (2022) which found that GPS tracking system has a strong positive influence on both reliability and customer assurance. Also, that radio frequency identification significantly influences reliability and customer assurance. More so, our findings corroborate that of Kubáňová et al. (2022) that barcodes have less user errors and it was chosen above RFID because it was an already known work technology that organizations adopt to improve logistics performance.

Conclusion and Recommendations

This study examined the relationship between EDI and business success of supermarkets in Port Harcourt. The findings indicate that EDI plays a significant role in increasing business success. From the empirical results it was revealed that, EDI positively and significantly relates to business success of supermarkets in Port Harcourt. Conclusively, EDI positively and significantly relates to business success measures of service speed, system reliability and cost minimization of supermarkets in Port Harcourt. The study recommends that:

- 1) Managers of supermarkets should ensure availability of EDI system to help them minimize transactional errors by eliminating manual data entry, ensure greater accuracy

in order processing and inventory management, accelerate transaction processing times, track orders, shipments, and inventory levels in real time, improve demand forecasting and reducing stockout leading to business success.

2) Managers of supermarkets should take advantage of EDI device in meeting up with the modern trends in supermarket business operation. They should seek to provide EDI to enable retail and warehouse environments that automate inventory processes to ensure real-time tracking, reduced stockouts and reduced human error while improving stock accuracy aimed at boosting service delivery speed and increasing overall business success.

3) Managers of supermarkets should adopt EDI as an operation system to track, identify and manage items. This can help them build system reliability and achieve success in business.

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