EMERGING TECHNOLOGIES AND CUSTOMS CLEARANCE PERFORMANCE IN NIGERIAN ROLL-ON/ROLL-OFF TERMINALS

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Abstract
Clearing goods from Nigerian Roll-On/Roll-Off terminals takes long time when compared with technologically inclined ports like Singapore port, Port of Shanghai in China etc. This research examines how emerging technologies affect customs clearance at Nigerian Roll-On/Roll-Off terminals. The aims of the study were to examine the effects of single window system and internet of things technologies on customer satisfaction at the surveyed RORO terminals. Survey research design was employed. The population consists of 4,468 (four thousand four hundred and sixty-eight) ports users (Council for the Regulation of Freight Forwarding in Nigeria, 2025). Simple random sampling technique was employed in this research report to choose the sample while Krejcie and Morgan (1970) statistical table for sample size determination was adopted to determine the sample size which is 354 (three hundred and fifty-four). Questionnaire was used to collect data. Data was analyzed with Pearson's correlation, simple percentage and frequency distribution table while hypotheses were tested with linear regression analysis using SPSS version 25. The study found that single window system and internet of things technologies have positive effects on customer satisfaction at surveyed RORO terminals in Nigeria. The study recommends that single window system and internet of things technologies should be fully integrated into customs clearance process in Nigeria. It was also recommended that government should provide adequate technological facilities to Nigerian Customs Service in order to enhance their operations and reduce time of clearing goods from RORO terminals in Nigeria

Key words: *Customs clearance, Customer satisfaction, Emerging Technologies, Internet of things, Performance, Single window, Terminals*

Introduction

Emerging technologies such as artificial intelligence, blockchain, robotics, single-window systems, 5G networks, and the Internet of Things (IoT) are transforming industries, economies, and societies globally by improving automation, operational efficiency, and data-driven decision-making (Daniel, 2024). These innovations are reshaping business operations and creating new sectors, while automating many human activities across industries (Anderson, Williams & Emdadul Hoque, 2023). As a result,

organizations increasingly depend on emerging technologies to improve productivity, optimize operations, and remain competitive in a rapidly changing global economy (Schatsky & Muraskin, 2018; Rahul & Deepak, 2023). Efficient single window systems and IoT technologies can improve cargo clearance processes at seaports, thereby enhancing international trade and cargo movement. Marieanne (2019) noted that subsidized port tariffs can further encourage higher cargo clearance volumes. Several countries have successfully implemented technological innovations to improve customs operations. For example, Singapore's TradeNet single-window system integrates government agencies into one computerized platform, reducing cargo clearance time and strengthening the country's position as a global logistics hub (Abdulsalam, 2025). In the United States, Customs and Border Protection (CBP) employs gamma-ray and X-ray scanner technologies under the Non-Intrusive Inspection (NII) model, alongside the Automated Commercial Environment (ACE), to improve cargo inspection, automate customs processes, enhance security, and increase revenue generation (Abdulsalam, 2025). Rwanda has also implemented an electronic Single Window system that supports electronic payments, rapid permit issuance, and accurate declarations, thereby reducing cargo clearance delays, corruption, and human interference (Abdulsalam, 2025).

This study focuses on Single Window Systems and IoT because limited studies have examined these technologies within the Nigerian port context, as most existing studies concentrate on developed countries. Previous studies by Rahul and Deepak (2023) and Daniel (2024) examined the influence of emerging technologies on operational systems, while Hoffman et al. (2020), Dhakal and Jha (2020), Carballo et al. (2014), Sirika and Gizaw (2016), and Rhodalyn (2018) investigated cargo clearance processes, customs delays, and the role of single-window systems in trade facilitation. However, empirical studies on the effects of Single Window Systems and IoT on Nigerian customs operations, particularly at Roll-on/Roll-off (RORO) terminals, remain limited. Therefore, this study seeks to fill this gap by examining how these emerging technologies can improve customs clearance performance at Nigerian RORO terminals.

Statement of the Problem

Clearing goods through Roll-On-Roll-Off (RORO) terminals in Nigeria has remained inefficient despite government policies aimed at improving cargo clearance. Cargoes often remain unprocessed for several days, leading to demurrage, congestion, loss of customers, poor port reputation, and reduced government revenue (Okechukwu & 2019). Reports indicated that over 6,386 imported containers were detained at Lagos ports, causing an estimated daily demurrage loss of ₦472.5 million, while more than 5,000 cargoes were trapped due to inefficiencies linked to the B'Odogwu customs platform, resulting in losses exceeding ₦2 trillion (The Guardian Nigeria, 2025). The

persistence of manual filing systems, bureaucratic customs procedures, and limited computerized operations has contributed significantly to delays in cargo clearance. Studies by Sirika and Gizaw (2016), Carballo et al. (2014), Rhodalyn (2018), Hoffman et al. (2020), and Dhakal and Jha (2020) identified excessive human involvement, poor automation, and weak customs systems as major causes of inefficiency and congestion in developing countries' ports.

To improve customs operations, the Nigerian government introduced several electronic systems such as ASYCUDA, NICIS II, Direct Trader Input (DTI), Trade Monitoring System (TMS), and the B'Odogwu platform, alongside training programs by the Nigeria Customs Service. These reforms were intended to enhance customs efficiency and trade facilitation (Rahul & Deepak, 2023; Daniel, 2024). However, inadequate integration of digital technologies and weak implementation frameworks continue to hinder effective customs clearance performance (Dhakal & Jha, 2020; Hoffman et al., 2020). Consequently, cargo dwell time in Nigerian ports still exceeds 10 days compared to the global benchmark of 1–2 days in ports such as Singapore and Rotterdam (BusinessDay, 2018).

Although previous studies including Rahul and Deepak (2023), Daniel (2024), Carballo et al. (2014), Sirika and Gizaw (2016), Rhodalyn (2018), Hoffman et al. (2020), and Dhakal and Jha (2020) examined emerging technologies and customs clearance, none specifically focused on Nigerian RORO terminals, leaving a population gap that this study addresses. Additionally, previous studies were largely empirical and did not employ inferential statistics to test hypotheses, creating a methodological gap that this study also fills. While most prior research relied primarily on secondary data, this study uses primary data. Moreover, this research addresses literature gaps by examining the combined impact of single window systems and IoT technologies on customs clearance performance, an area previously unexplored.

Objectives

This study aim to examine the effects of emerging technologies on customs clearance performance in Nigerian RORO terminals The specific objectives of the study are to:

1. examine the effect of single window system on customer satisfaction in Nigerian RORO terminals
2. investigate the effect of internet of things on customer satisfaction in Nigerian RORO terminals
3. assess the combined effects of single window systema and internet of things on customer satisfaction in Nigerian RORO terminals

Research Questions

Based on the literature gaps identified, the following research questions were asked the respondents:

a. How does single window system affect customer satisfaction in Nigerian RORO terminals?
b. To what extent does internet of things affect customer satisfaction in Nigerian RORO terminals?
c. Does single window system and internet of things combined affect customer satisfaction in Nigerian RORO terminals?

Research Hypotheses

The following Hypothesis were tested in this research:

H_{01}: Single window system does not affect customer satisfaction in Nigerian RORO terminals

H_{o2}: Internet of things does not affect customer satisfaction in Nigerian RORO terminals

H_{03}: Single window system and internet of things does not affect customer satisfaction in Nigerian RORO terminals

Literature Review

Conceptual Review

Emerging Technologies

Emerging technologies are modern and innovative technologies that are newly introduced, under development, or currently applied in business operations to improve organizational effectiveness and profitability (Schatsky & Muraskin, 2018; Rahul & Deepak, 2023). Mascus (2003) described technology as data-driven tools intentionally designed to achieve profitable outcomes through the integration of manufacturing processes, management strategies, financing, advertising methods, and other organizational systems. Technology also involves technical skills, knowledge, expertise, and systems used in product development, beyond the physical components of a product or service (Lovell, 1998; Bozeman, 2000). Tihanyi and Roath (2002) further explained that technology consists of information that is difficult to imitate or replicate, while Reisman (2006) viewed it as the adoption of materials, machinery, equipment, and systems used to provide sustainable solutions to human problems. Similarly, Levin (1996) defined technology as both a practical approach and a tangible tool that applies scientific principles to solving human challenges.

The Internet of Things (IoT)

The Internet of Things (IoT) is a transformative technology that connects physical devices and products to the internet for data collection and exchange, thereby improving production efficiency, customer experience, and information-based decision-making within organizations (Microsoft, 2023; Rahul & Deepak, 2023). Wang (2011) described IoT as a broad network that integrates humans with modern technologies, while Kamble, Gunasekaran, and Gawankar (2018) defined it as a system of interconnected devices that transmit and receive real-time information to enhance transparency, efficiency, and effectiveness in supply chain and logistics management.

IoT devices such as sensors and RFID tags provide continuous data on location, temperature, speed, and other operational parameters, thereby supporting effective tracking, monitoring, and timely decision-making in logistics operations (Ben-Daya, Hassini, & Bahroun, 2019). IoT also improves inventory management by providing accurate and real-time information on stock levels, reducing overstocking and stock shortages while enhancing inventory efficiency (Wang, Gunasekaran, Ngai, & Papadopoulos, 2016). Furthermore, IoT contributes to efficient supply chain management through better utilization of material resources, waste reduction, optimized logistics routes, reduced fuel consumption, and lower emissions (De Vass et al., 2018). It also supports compliance with regulatory standards by improving product tracking, traceability, and operational transparency across logistics activities (Gupta et al., 2019).

Single window system

The United Nations Economic Commission for Europe (UNECE) defined a single window system in 2003 as a framework that enables traders to submit all required import and export information through one centralized authority to meet regulatory requirements. Examples of such systems include the ASEAN framework, Singapore's TradeNet platform, and AsycudaWorld, which operates in about 102 countries, including several African nations such as The Gambia, Côte d'Ivoire, Mali, Mauritania, Malawi, and Madagascar. According to UNECE (2003), the single window system simplifies and facilitates information exchange between cross-border traders and government agencies through a single interface where standardized documents and data are submitted once for import, export, and transit compliance. The system supports efficient cooperation among Customs, Other Government Agencies (OGAs), and businesses through the use of information technology innovations.

Widdowson et al. (2019) further described the single window as a framework of principles and integrated processes that strengthen government regulatory capacity

while facilitating smooth and efficient trade movement across borders. Although basic forms of single-window systems existed earlier, their widespread adoption increased with the expansion of internet technology toward the end of the 20th century. UNECE (2003) strongly promoted their adoption to streamline border procedures by consolidating documentation into a single electronic system.

Following the adoption of the Kyoto Convention aimed at modernizing and harmonizing customs procedures, many countries implemented single window systems to facilitate international trade (Mwajita, 2016; Njatrijani et al., 2022; Peynirci, 2023). This global adoption was largely influenced by the benefits of simplification, transparency, and inter-agency cooperation emphasized by UNECE (2005).

Organizational Performance

According to Alahmad (2021), organizational performance refers to the extent to which a company's actual results align with its planned objectives. This concept indicates how effectively an organization meets its goals, fulfills customer expectations, and generates revenue. More generally, organizational performance can be described as an organization's capability to achieve its intended objectives. It is a key concept in contemporary business management, covering a wide range of aspects, from conventional financial indicators to social and environmental outcomes (Moumin, 2024).

Organizational performance denotes the outcomes achieved by an organization, typically evaluated through quantifiable indicators such as profitability or market share. Beyond results, it encompasses the processes, strategies, and managerial actions undertaken to attain these objectives (Bourguignon, 2000; Moumin, 2024). Fundamentally, the concept rests on the understanding that an organization constitutes a deliberate integration of productive resources—including human, physical, and financial capital—geared toward generating maximum value for both stakeholders and contributors (Carton, 2004; Mwagona & Kinyua, 2023).

Customs clearance

Customs clearance refers to the official approval granted by customs authorities for imported goods to enter a country or exported goods to leave it. The process includes preparing and submitting import or export documents, representing clients during customs inspections, processing duty assessments and payments, and releasing cargo with the required documents after clearance (Marieanne, 2019). According to Wulf and Sokol (2004), customs clearance activities are mainly carried out by customs officials, and although procedures differ across countries, customs administrations generally

perform four key functions: revenue collection, regulatory compliance, trade facilitation, and security maintenance.

Customs clearance also covers both import and export procedures. Importing involves bringing foreign goods into a domestic market where they must undergo customs clearance before use or sale, while exporting refers to sending goods already in free circulation within a country to another country (DoC, 2019).

Customer Satisfaction

Customer satisfaction is an important objective for organizations because firms that successfully satisfy customers often achieve improved financial performance (Bolton & Drew, 2021). It occurs when products or services meet or exceed customers' needs, wants, and expectations, thereby encouraging repeat purchases, customer loyalty, and profitability (Aksar, Kayani & Ali, 2020). Suchánek and Králová (2018) explained customer satisfaction as the difference between customer expectations and the actual experience received. Mohammad and Mohammad-Alhamadani (2011) described customer satisfaction as an attitude formed after purchase through the comparison between expected and perceived service quality. Similarly, Sambo et al. (2021) viewed it as the emotional reaction of pleasure or disappointment resulting from whether service performance meets expectations. High customer satisfaction contributes to customer loyalty, stronger customer relationships, tolerance for service failures, positive word-of-mouth promotion, increased spending, higher sales, attraction of new customers, cost reduction, and improved profitability (Adeola & Adebiyi, 2014).

Empirical Review

Rahul and Deepak (2023) found that emerging technologies such as Artificial Intelligence, Blockchain, Internet of Things, Cloud Computing, and Robotic Process Automation improve customer experience, reduce operational costs, and enhance organizational efficiency, thereby helping businesses gain competitive advantage. Similarly, Daniel (2024) revealed that emerging technologies significantly promote innovation and societal development across sectors such as healthcare, finance, education, and the workforce, although their adoption also presents ethical and operational challenges.

Refman et al. (2020) found that delays in import cargo are mainly caused by customs procedures, while delays in transit cargo are largely attributed to terminal operator activities and port management processes. Likewise, Dhakal and Jha (2020) discovered that most delays in customs clearance occur between processing stages rather than

during actual customs processing. The study identified late cargo clearance by owners, shortage of agents, and hidden syndicates as major causes of delays.

Carballo et al. (2014) reported that customs clearance delays increase import costs, with each additional day of delay raising costs by approximately 0.7% for small firms and 0.9% for large firms. Similarly, Sirika and Gizaw (2016) found that prolonged delays significantly increase customs clearance costs, while Rhodalyn (2018) concluded that the implementation of a single window system reduces transaction time and lowers the cost of clearing goods.

Theoretical Reveiew

Technology Acceptance Theory by Davis in 1986

This study is based on the Technology Acceptance Theory, proposed by Davis (1986), which explains why users adopt new technologies. While innovations can be perceived as disruptive to existing practices, they often offer opportunities for improved efficiency and service delivery. Research shows that barriers to adoption, such as employees' reluctance to move from familiar to unfamiliar systems, significantly affect acceptance rates (Okoye, Omankhanlen, Okoh, Ezeji & Achugamonu, 2019; Lai, 2017). The Technological Acceptance Model (TAM) originates from the Theory of Reasoned Action (TRA) by Fishbein and Ajzen (1975), which links attitudes to behavior. TRA asserts that an individual's intention is the strongest predictor of performing a behavior and defines actions in terms of the behavior, target, context, and timing.

Davis (cited in Okoye et al., 2019) defines perceived usefulness as the likelihood that using a technology enhances performance, while perceived ease of use reflects how effortlessly users can engage with it, improving satisfaction. External factors, including political and social influences, also shape these perceptions (Surendran, 2012).

Technology Acceptance Model

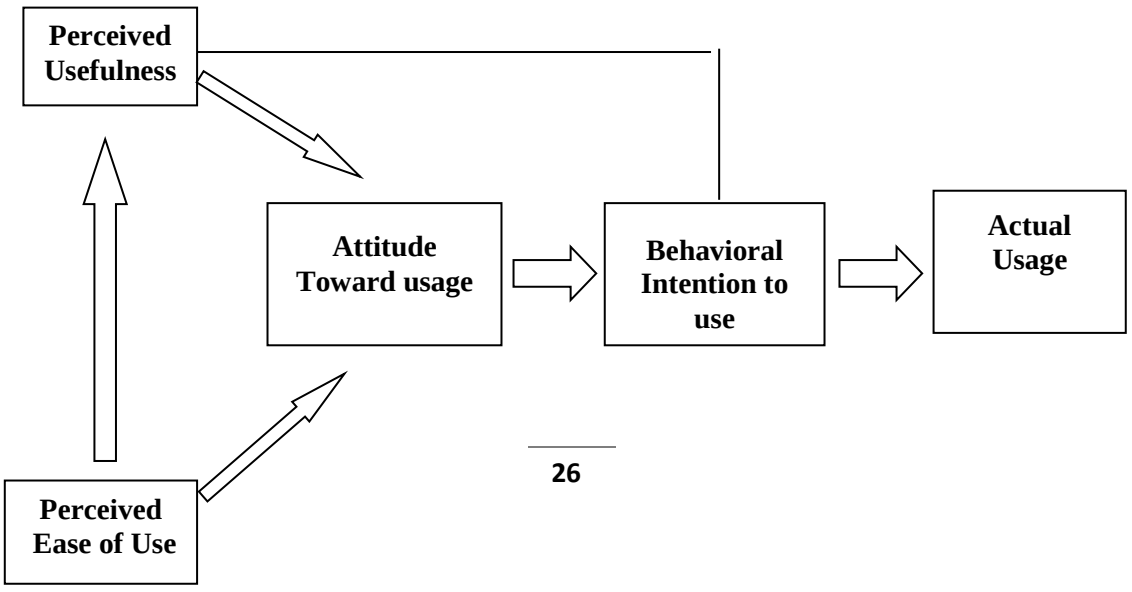


Figure 1: Perceived Usefulness, Perceived Ease of Use, and User Acceptance of information Technology

Source: Davis (1989)

Methodology

Survey research design was adopted in this study. The data for the study was obtained with the aid of questionnaire from port users at Five stars Logistics Limited and Ports and Terminal Multiservices Limited terminals in Tin Can Island Port, Apapa, Lagos, Nigeria the two terminals were chosen because they handle RORO cargoes in Nigeria. Questionnaires were administered via google forms and hand to hand delivery to the respondents. The population consists of 4,468 (four thousand four hundred and sixty-eight) customs license agents both corporate and individuals (Council for the Regulation of Freight Forwarding in Nigeria, 2025). Respondents for the study were selected through a simple random sampling technique to guarantee equal chances of selection among all port users. The sample size of 354 participants was obtained using the statistical table for sample size determination developed by Krejcie and Morgan (1970).

Model Specification

This study examines the effects of single window system and internet of things technologies on customer satisfaction at the surveyed RORO terminals in Nigeria.

Customer Satisfaction (CS) is a function of Emerging Technologies (ET). Single window system (SW) and internet of things (IoT) was used to proxy Emerging Technologies (ET).

The function is represented as follows.

$CS = f\ (ET)$…… Eqn 1.

From equation i

The model is thus specified as:

$CS= \beta_0 + \beta_1 SW+ \beta_2 IoT+ \mu t$…… Eqn 2.

Where: CS = customer satisfaction, β_0= Constant, β_1SW= Single window system, β_2IoT= internet of things, $\beta_0 \ldots \beta_2$ = Regression coefficients of the model., A priori expectation: $\beta_1 > 0$ and $\beta_2 > 0$

Descriptive statistics used to analyze data collected in this research were simple percentage, frequency table, while inferential statistics includes linear regression analysis used for testing the hypotheses and Pearson's correlation analysis with SPSS version 25 software. In testing the reliability of the instrument Cronbach's Alpha method was used which was 0.82 with the aid of SPSS version 25 software. The validity of the research instrument was ensured by the experts who cross checked the questionnaire before they were distributed to the respondents.

Data Analysis, Results and Interpretation

354 (three hundred and fifty-four) copies of questionnaire were administered to the respondents, out of which 292 (two hundred and ninety-two) copies were correctly filled and returned. The result was 82% response rate and was considered valid for the research.

Table 1: Demographic Characteristics of Respondents

Variables	Category	Frequency	Percent (%)	Cumulative Percent (%)
Sex	Male	221	75.7	75.7
	Female	71	24.3	100.0
	Total	292	100.0	
Years of Service	3–6 Years	97	33.2	33.2
	7–10 Years	116	39.7	72.9
	11 Years and Above	79	27.1	100.0
	Total	292	100.0	
Academic Qualifications	FSLC	67	22.9	22.9
	SSSC/Equivalent	99	33.9	56.8
	OND/NCE	110	37.7	94.5
	HND/B.Sc. and Above	16	5.5	100.0
	Total	292	100.0	

Source: Field Study, 2025

Table 1 presents the demographic characteristics of the respondents involved in the study. The findings show that 221 respondents (75.7%) were male, while 71 respondents (24.3%) were female, indicating that both genders were represented in the study. In terms of work experience, 97 respondents (33.2%) had 3–6 years of

experience, 116 respondents (39.7%) had 7–10 years, while 79 respondents (27.1%) had between 11 and 15 years or more in the industry. Regarding educational qualifications, 67 respondents (22.9%) possessed FSLC, 99 respondents (33.9%) held SSSC or its equivalent, 110 respondents (37.7%) had OND/NCE qualifications, while 16 respondents (5.5%) possessed HND, B.Sc., or other higher qualifications. Overall, the results suggest that the respondents were fairly experienced and that the majority had attained at least post-secondary education, with OND/NCE holders forming the largest educational category.

Table 2: Correlations

		SINGLE WINDOW SYSTEM	INERNET OF THINGS	CUSTOMER SATISFACTION
SINGLE WINDOW SYSTEM	Pearson Correlation	1	.794**	.266**
	Sig. (2-tailed)		.000	.000
	N	292	292	292
INERNET OF THINGS	Pearson Correlation	.794**	1	.275**
	Sig. (2-tailed)	.000		.000
	N	292	292	292
CUSTOMER SATISFACTION	Pearson Correlation	.266**	.275**	1
	Sig. (2-tailed)	.000	.000	
	N	292	292	292

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

Source: SPSS version 25 output

The Pearson correlation analysis was carried out to examine the relationship between each variable in the study. The results indicate that single window system (SW) and customer satisfaction (CS) have a weak positive correlation (r = .266). Moreso, internet of things (IoT) and customer satisfaction (CS) also have a weak positive correlation (r = .275), while single window system (SW) and internet of things (IoT) are strongly correlated (r = .794), implyng that both technologies complement each other in port operations. Since all probability values are less than 0.01, the relationships are statistically significant. The policy implication is that terminal operators and maritime regulatory agencies should strengthen investments in digital technologies and integrated smart systems to improve service efficiency and enhance customer

satisfaction.

Test of Hypotheses

Hypothesis One

H_0: Single window system does not affect customer satisfaction in Nigerian RORO terminals

H_1: Single window system affects customer satisfaction in Nigerian RORO terminals

Table 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.266[a]	.071	.067	.39782

a. Predictors: (Constant), SINGLE WINDOW SYSTEM

Source: SPSS version 25 output

Results from the table indicated a regression value of R=.266[a] this showed a positive relationship between single window system and customer satisfaction in Nigerian RORO terminals. Further result of the R^2 = .071 showed that single window system contributed 7.1% of the variance in customer satisfaction in Nigerian RORO terminals. This is insignificant amount as such it can be concluded that single window system could not predict customer satisfaction in Nigeria customs clearance process.

Table 4: ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3.485	1	3.485	22.022	.000[b]
	Residual	45.895	290	.158		
	Total	49.380	291			

a. Dependent Variable: CUSTOMER SATISFACTION

b. Predictors: (Constant), SINGLE WINDOW SYSTEM

Source: SPSS version 25 output

Findings from the table showed an F(1); 290=22.022; p =.000) this indicates that the relationship between single window system and customer satisfaction is a good fit and significant, given that the F- calculated is greater than 1.

Table 5: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	3.869	.071		54.879	.000
	SINGLE WINDOW SYSTEM	.092	.020	.266	4.693	.000

a. Dependent Variable: CUSTOMER SATISFACTION

Source: SPSS version 25 output

The results of the study indicate a significance value of 0.000, which falls well below the conventional threshold of 0.05. This finding provides strong statistical evidence to reject the null hypothesis. Therefore, the alternative hypothesis is accepted, confirming that the adoption of a single window system significantly influences customer satisfaction at Nigeria's RORO terminals. This suggests that integrating a streamlined, centralized processing system can enhance service delivery and improve the overall experience for port users.

Hypothesis Two

H_0: Internet of things does not affect customer satisfaction in Nigerian RORO terminals

H_1: Internet of things affect customer satisfaction in Nigerian RORO terminals

Table 6: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.275[a]	.075	.072	.39677

a. Predictors: (Constant), INERNET OF THINGS
Source: SPSS version 25 output

Results from the table indicated a regression value of R=.275[a] this showed that there is a positive relationship between internet of things and customer satisfaction in Nigerian RORO terminals Further result of the R^2 = .075 showed that internet of things contributed 7.5% of the variance in customer satisfaction

Table 7: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.728	1	3.728	23.678	.000[b]
	Residual	45.653	290	.157		
	Total	49.380	291			

a. Dependent Variable: CUSTOMER SATISFACTION
b. Predictors: (Constant), INERNET OF THINGS
Source: SPSS version 25 output

Findings from the table showed an F(1); 290=23.678; p =.000) this indicates that the relationship between internet of things and customer satisfaction is a good fit and significant, given that the F- calculated is greater than 1.

Table 8: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.592	.123		29.123	.000
	INERNET OF THINGS	.157	.032	.275	4.866	.000

a. Dependent Variable: CUSTOMER SATISFACTION
Source: SPSS version 25 output

The findings revealed a significance value of .000, which is below the 0.05 threshold, leading to the rejection of the null hypothesis. This indicates that the Internet of Things significantly influences customer satisfaction at Nigerian RORO terminals, underscoring its role in improving service efficiency and user experience.

Hypothesis Three

H_0: Single window system and internet of things does not affect customer satisfaction in Nigerian RORO terminals

H_1: Single window system and internet of things affect customer satisfaction in Nigerian RORO terminals

Table 9: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.286[a]	.082	.075	.39614

a. Predictors: (Constant), SINGLE WINDOW SYSTEM, INERNET OF THINGS
Source: SPSS version 25 output

Results from the table indicated a regression value of R=.286[a] this showed that there is a positive relationship between single window system, internet of things and customer satisfaction in Nigerian RORO terminals. Further result of the R^2 = .082 showed that single window system and internet of things contributed 8.2% of the variance in customers satisfaction in Nigerian RORO terminals.

Table 10: ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	4.029	2	2.015	12.838	.000[b]
	Residual	45.351	289	.157		
	Total	49.380	291			

a. Dependent Variable: CUSTOMER SATISFACTION
b. Predictors: (Constant), SINGLE WINDOW SYSTEM, INERNET OF THINGS
Source: SPSS version 25 output

Findings from the table showed an F(1); 289=12.838; p =.000) this indicates that the relationship between single window system, internet of things and customer satisfaction is a good fit and significant, given that the F- calculated is greater than 1

Table 11: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	3.660	.133		27.617	.000
	INERNET OF THINGS	.099	.053	.173	1.862	.064
	SINGLE WINDOW SYSTEM	.044	.032	.129	1.386	.167

a. Dependent Variable: CUSTOMER SATISFACTION

Source: SPSS version 25 output

Findings showed sig. value =.064 for internet of things and sig. value=1.67 for single window system which is above the tolerable level of significance for the study (0.05). Based on the significant value, the null hypothesis which state that single window system and internet of things does not affect customer satisfaction in Nigerian RORO terminals is accepted.

Conclusion and Recommendations

This study examined the effects of emerging technologies on customs clearance performance in Nigerian RORO terminals. Based on the research evidence, it was concluded that single window system positively affect customer satisfaction in Nigeria RORO terminals. Also, that internet of things affect customer satisfaction in Nigerian RORO terminals. The study concludes that single window system and internet of things combined does not affect customer satisfaction in Nigerian RORO terminals. Lastly, it was concluded that emerging technologies positively affect customs clearance performance in Nigerian RORO terminals.

The study recommends that single window system and intent of things technologies should be fully integrated into custom clearance process in Nigeria. It was also recommended that government should provide adequate technologies facilities to support Nigerian Customs Service in order to enhance their operations and reduce time of clearing goods from RORO terminals in Nigeria and private terminal operators should provide up-to-date facilities and equipment as well as technologies instruments in order to enhance their operations.

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