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MATERIAL MANAGEMENT STRATEGIES AND SERVICE DELIVERY PERFORMANCE OF UPSTREAM OIL FIRMS IN RIVERS STATE

By

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ABSTRACT:

This paper examined the relationship between materials management strategies and service delivery performance of upstream oil firms in Rivers State. The aim was to examine the relationship between materials management strategies and service delivery performance of upstream oil firms in Rivers State. The study adopted cross-sectional research design. 40 copies of questionnaire distributed and 35 were valid. The Spearman Rank Order Correlation Coefficient was used with the aid of Statistical Package for Social Sciences (SPSS version 23.0), Cronbach Alpha verified the internal consistency and validity status and the results were positive. The findings of the study showed that MMS significantly related with service delivery performance of upstream oil firms in Rivers State, thus enhancing delivery reliability and on-time delivery. The study concluded that MMS indicators positively and significantly related with service delivery performance measures. Based on the findings, the study, recommends that, upstream oil firms need to have the necessary skills and knowledge about the use of scientific material management techniques and decision models. It is recommended that, pragmatic measures be adopted to implement efficient and effective inventory management software.

KEYWORDS:

Material Management Strategies, Service Delivery Performance, Upstream Oil Firms

1.0 Introduction

In a world of fearsome competition driven by globalization, increasing consumer awareness, and technological improvement, business enterprises that are keen towards success must at all times hype its oil products/services availability to avoid diversion priorities by customers (Sharma & Modgil, 2019). Oil is one of the world's most important materials used by household and industrial aims. Nigeria is one of the largest producers of oil in West Africa. The supply chain of the oil and gas firms comprises of upstream, midstream, and downstream sectors (NNPC, 2016). The upstream is the maritime firm that concentrates with the production (extraction and drilling) of crude petroleum. Materials which some scholars referred to as inventory in enterprises today, is a fundamental position that has attracted scholarly attention from the business world. Ballou (2000) opines that materials is key to the successful functioning of any manufacturing company as it is the spark of life and the heart of any manufacturing system. Scholar like Rumelt (2002) classified materials used in manufacturing firm under three headings: Raw materials primarily from agriculture and the various extractive industries e.g. mineral resources, fruits, and vegetables sold to processor. Semi-finished goods and processed materials to which some work has been applied or value added e.g. rods, wires, paper, chemicals, etc. Component parts and assemblies that are completely finished products of one manufacture, which can be used as part of more complex product by another manufactures. Managing of these materials are referred to as materials management. Thus, Lee and Dobler (1997) defined materials management as the total of all those tasks, functions and schedules which are concerned with the movement of outward materials and services into the firm and the administration of same while waiting for when they are consumed or used up in the process of production, operation or sales .

Lysons (2006) also said that, materials management involves a process of efficiently overseeing the continuous flow of inventory units into and out of an existing inventory. This process usually involves controlling the movement of units in order to prevent the materials from becoming too high, or dwindling to levels that could put operation into jeopardy. Material management in the words of Ali et al. (2012) is used for analyzing product sales, detect popular item in stock and ready to instantly fulfill any customer's order. Ali et al. (2012) further revealed that materials management strategies enable organization to detect special orders, sell on occasion and available products in a limited quantity to keep inventory costs down and to develop a positive reputation for quickly filling special orders. Materials management includes all activities in the flow of materials from the supplier to the consumer.

Many studies have been conducted on materials management strategies and service delivery performance. Amachree et al. (2017) examined and developed material management strategies (MMS) which could be creatively employed for Productivity Improvement in Equipment Firms (PIEMF) Equipment manufacturing projects suffer from declining productivity and inability to effectively satisfy customized order batch quantity within schedules, budgeted cost and quality specifications due to lack of robust in selected firms such as Siemens Nig. Ltd, Dresser-Rand Nig. Ltd and Nigerian Engineering Works Ltd using Materials Requirements Planning (MRP) followed by Supply Chain Management (SCM) as dimensions. Ibegbulem and Okorie (2015) investigated on assessment of materials management and profitability of an organization. Joseph et al. (2019) examined the effective inventory control and effective drilling activities of oil and gas drilling firms as well as its relationship with revenue generating capabilities of oil drilling firms in Nigeria. Anichebe (2013) conducted a study on the impact of proper inventory management on organisational performance in Emenite, Hardis & Dromedas and the Nigeria Bottling Company all in Enugu, Enugu State. Gowon et al. (2021) studied on material procurement and handling practice on completed

building project cost in Yola metropolis, Adamawa State Nigeria. Tarurhor and Osazevbaru (2021) investigates the effects of materials management on customers` satisfaction with lead time as a moderator variable in government-owned hospitals in Delta State, Nigeria operationalizing using strategic supplier partnership, lean inventory, and information technology as the proxies of materials management and customer satisfaction. None of this report combined materials management strategies and service delivery performance in upstream oil firms in Rivers State. This spurs the researcher sole aim to embark on filling this gap using material handling and just-in-time inventory as proxies of materials management strategies. It is against this point, the researcher decides to investigate the importance of material management strategies and service delivery performance in upstream oil firms in Rivers State.

1.1 Statement of the Problem

The increasing globalization of market is forcing intense competition, consequently resulting poor service delivery performance. Due to the extents of materials movements, problems can arise in a wide range of contexts, for example longer lead times, high amount of time spent on material transportation, handling and unnecessary movements can occur. Material management strategy has come to be recognized as a vital problem area needing attention in upstream oil firms in Rivers State due to increased demand from customers and shareholders. Despite the establishment of re-order levels order, quantities are still determined somewhat based on past usage. Improper quantities ordered occasionally leads to unexpected situations of stock out and overstocking. Shortage of materials are occasionally attributed to long procurement procedures, delivery reliability, on-time delivery, delivery speed, occasional shortages of vital products in the market, lack of sufficient funds with which to purchase new supplies, unwillingness of suppliers to supply firms due to delayed payments, inadequately trained staff in the materials management section and the inadequacies of the firm's stock management strategies.

However, some other problems firms might experience due to the inability in managing the materials are productivity decrease, changes in customers' commitment levels, and unfavorable cost increase to organization. Problems are likely to raise when material is not tracked properly, inefficiency and additional costs mount. Supplies get lost, shrinkage can go unchecked, stock-outs occur, critical equipment locations are uncertain, billing is inefficient since supplies are used without being associated to patient's record, and on-hand inventory can balloon unnecessarily. All of this leads to inefficiency and additional costs. This invariable could result to poor sales turnover, low profitability as well as stalled growth of the organisation. Maintaining accurate records of materials improves service delivery performance by improving delivery reliability, on-time delivery and delivery speed. Therefore, this study was undertaken to fill the knowledge gap by assessing the influence of materials management strategies on service delivery performance of upstream oil firms in Rivers State.

1.2. Aim and Objectives of the Study

Based on the identified problem, this study aims to determine the relationship between materials management strategies and service delivery performance of upstream oil firms in Rivers State. Based on this, the specific objectives are to:

- i. determine the relationship between materials handling and service delivery performance of upstream oil firms in Rivers State.
- ii. ascertain the relationship between just- in-time inventory and service delivery performance of upstream oil firms in Rivers State.

1.3 Research Hypotheses

Based on the objectives and research questions, the following null hypotheses were formulated.

- H₀₁: There is no significant relationship between materials handling and delivery reliability of upstream oil firms in Rivers State.
- H₀₂: The relationship between materials handling and on-time delivery of upstream oil firms in Rivers State is not significant.
- H₀₃: There is no significant relationship between just- in-time inventory and delivery reliability of upstream oil firms in Rivers State.
- H₀₄: The relationship between just- in-time inventory and on-time delivery of upstream oil firms in Rivers State is not significant.

2.0 Literature Review

2.1 Theoretical Framework: Economic order quantity (EOQ) model underpins this paper. Economic order quantity (EOQ) model was developed by F.W.Haris in 1913 and is also known as Wilson EOQ model, who critically analyzed the model in detailed (Arsham, 2006 as cited in Oballah et al., 2015). Determining optimal ordering quantity is one of the focal aspects in materials management that can expedite firms' materials managers to operate at optimal cost. The use of EOQ has presented upturn in some costs as other costs drop, an example of ordering costs reduce with the inventory holdings, while holding costs rise and the total inventory associated costs curve have a minimum point. The model also revealed as the point where total inventory costs are minimized. It is the level of inventory that minimizes the total of inventory holding costs and ordering costs. The EOQ considers materials holding costs, ordering costs, demand rate; lead time progression and the price per unit. It obliges that for every material kept in the stores, there is need to decide the reorder point and that of the factual quantity to order. The model assumes that all other variables are always constant even though uncertainties are shared. Due to uncertainties experienced in business environment improved EOQ is used where vacillation in demand is a common occurrence.

2.2 Materials Management Strategies

One of the underpinning factors for a successful organizational activity is its ability to control and manage materials used in production. Material is that stock of goods held for carrying out company activities. Materials here include its raw materials; work-in-progress; supplies used in operations as well as finished goods. Raw materials are items that are yet to go into final processing. Supplies include items such as Maintenance, Repair and Operating materials. Works-in-progress are materials that have undergone half or partial processing. Finished goods on the other hand are perfect from the factory and ready for distribution (Kothari, 1992). Materials management has been recognized as one of the best important functions that has vast waves on delivery performance. Materials management is a vivacious concept in making decisions to best treat the materials availability in a company, such as activities, material management policies, and processes to hand the stock to sufficiently guarantee the quantity of each stocks at all times kept in the warehouse (Chan et al., 2017). As stock is a vital constituent of the current assets in the balance sheet, it is clear to say that it is imperative for business enterprise to give more attention to efficiently manage all firm sizes: large, medium, or even small ones (Bi et al., 2020) to promote the company's delivery performance (Elsayed & Wahba, 2013). Materials management or materials control, is an effort to balance materials needs and requirements with the aim to curtail costs attracted resulting from obtaining and holding materials (Eneje et al., 2012).

Eneje et al. (2012) define materials management as the strategies involved in getting raw materials and supplies to the point of production and moving in process inventory through the firm. George

(1985 as cited in Orga & Mbah, 2017) define it as a scientific act of controlling the volume of item level held in various firms within a firm to meet economically the intervals and external demand priced upon that business. Materials management strategies refers to all the doings involved in developing and managing the stock levels, whether the stock is raw materials, semi-finished material or finished goods, so the adequate supplies must be always available and the firm must make sure the cost of over or under stocks are always low (Kotler, 2002). Similarly, Gerald (2006 as cited in Orga & Mbah, 2017), sees materials management strategies as processes of managing stocks in order to meet end-users' needs by maintaining the lowest possible cost of keeping those items. Management of materials in an organization typically represents 45-90% of all expenses and is therefore needed to make certain that the company has the right materials at hand to avoid out of stocks, shrinkage (spoilage/theft), and to provide proper accounting records (Khan & Thomas, 2007). Fried et al. (2008) opined that material management be made up of everything from accurate record-keeping of items to shipping and receiving of stocks on time. It is the process of efficiently overseeing the continual flow of units into and out of an existing stock of items. It is the process that ensures balances of items and stocks are maintained at the right quantity, quality, place and time in an organization, to ensure organizational business continuum (Augustine & Agu, 2013).

2.2.1 Materials Handling

Material handling has come to be perceived as an unmistakable crucial point with the operation of large-scale manufacturing firms. Material handling comes before processing of completed products held for distribution to customers (Coyle et al., 2014). Material handling with is essential hubs in a material management framework as it perform important functions that help the development of materials, handling items, de-amassing vehicle loads, making inventories keeping unit combinations and gathering materials for distribution purposes (Andre & Riopel, 2015). The effectiveness of material dealing in the stores ensures optimal production and dissemination complete products with main objective of cost diminution and service delivery performance improvement. Patel and Vyas (2011) defined material handling as using the right approach, quantity, material, place, time, sequence, position, condition, and cost. This involves handling, storing, and controlling of the firm materials. The significance of materials handling sprouts from the basic relationship that it has with production flow. When it presents unevenness, there is formation of spare stock or break in supply. Material handling involves the movement of materials within a short distance that takes place within a factory and between buildings to the transportation agency (Arora & Saxena, 2001). Material handling has often been used as the scientific and systematic means of moving, packaging, and storing of materials in any form. However, material handling accounts for 35% of all employees, 45% of all factory space, and 80-90% of production time (Chu, 2002). Material handling is involved at all stages from the time the raw material enters the factory till the finished product goes out. Depending on the type, a component may be handled even fifty times or more before it changes to finished product. As material handling adds no value but surges the operation cycle time, it is desirable to eliminate handling wherever possible.

2.2.2 Just-in-Time Inventory

The manner in which upstream oil firms operated witnessed as significant change in the last quarter of the 20th century by the introduction of concepts like Just-in-time material strategies. Just-in-time as an operational philosophy has been of great interest to manufacturers and researchers alike over the past years. The American Production and Inventory Control Society (APICS, 1992) defines just-in-time inventory (JITI) as a philosophy of overall unceasing improvement towards actualizing

excellence and reducing wastages. Simply put, JITI epitomizes a material management philosophy which is geared towards meeting the demands of the customers in time. According to Singh and Ahuja, (2012), JITI beliefs is based on the concept of delivering raw materials when needed and producing products when there is a need. The main emphasis is on minimizing all kind of materials like raw material, work-in-process (WIP) and finished goods with the mindset of cutting costs of materials and also helping to uncover other more serious inefficiencies (poor maintenance, poor quality, inspection, backlogs, etc.) in the firm's operation cycle.

There are colossal evidences that the adoption integrated material management strategies such as JITI leads to improvement of delivery performance (Fullerton & McWatters, 2002). In the view of Burt et al. (2010) JITI places emphasis on efficient and effective flow of materials, reliability in delivery, an intimate customer-supplier relationship and steady quality delivery with zero defects. According to Bragg, (2013) JITI strategies ensures the level of material is maintained by producing only for specific customer orders. In its broader sense, the ability of business establishments to eliminate waste to its acceptable minimum guarantees achievement of improved service delivery performance. In the view of Ebitu (2014) JIT ensures firms achieve effectiveness by facilitating supply of goods to the production point just at the time it is needed for production and that finished goods are shipped to customers in few hours after production. Bragg (2013) argued that JITI ensures less cash investment in materials, less materials is kept, reduction in materials obsolesces and reduction in operation runs. Similarly, Ebitu (2014) observed that JIT materials control strategy reduces inventory holding cost, shortens lead time, improves better relationship with suppliers and storage cost reduction.

2.3 Service Delivery Performance

Service delivery performance (SDP) can be defined as the level up to which products and services supplied by an organization meet the customer expectation. It provides an indication of the potentiality of the materials management in providing stocks to the customer. This metric is most important in materials management as it integrates (involves) the measurement of performance right from supplier end to the customer end (Madhusudhana et al., 2011). Fast, reliable delivery is a key consideration when a firm selects a supplier (Viswanadham, 2000). Superior delivery performance can motivate customers to buy repeatedly or even pay more (Rao et al., 2011). Firms have implemented various practices to enhance service delivery performance. SDP includes two high-level dimensions, reliability and speed, which can be further broken down into four more-detailed dimensions: on-time delivery rate, early delivery inaccuracy, late delivery inaccuracy, and delivery speed. Each dimension may affect customers' operations differently.

However, related empirical studies typically only examine a single dimension or a composite measure of SDP (e.g., order timeliness, Vaidyanathan & Devaraj, 2008). While lumping potentially divergent SDP dimensions into a composite measure makes it difficult to evaluate the impact of a single dimension, scrutinizing only one dimension may provide incomplete and biased conclusions due to the omission of other SDP dimensions that may affect both the dimension under consideration and the ultimate order quantity and unit price. Prior research uses SDP measures that do not allow a detailed and accurate assessment of how delivery performance affects order quantity and unit price. For example, the effect of early delivery has not been examined in a B2B setting, although buyers are increasingly demanding suppliers to deliver within tight time windows (American Society for Quality, 2010). Further, it is unclear whether customers react differently to large and small delays. Moreover, suppliers may provide superior SDP to large customers and prioritize large orders. Yet prior studies do not thoroughly control for these effects.

2.3.1 Delivery Reliability

Reliability is defined as the ability to perform a promised service consistently and precisely (Parasuraman et al., 2005). Similarly, reliability is concerned with the delivery of the service in an appropriate condition on time (Holloway & Beatty, 2003). Reliability is translated into the ability of the service provider to execute the service in a safe and efficient manner (Mileide et al., 2013). It depicts the consistent performance, free on compliance, in which the customer can trust. The service provider must deliver what was promised without the need for rework. Reliability refers to the ability to deliver expected standard at all time, how the organization handle customer services problem, performing right services for the first time, providing services within promised time and maintaining error free record (Iberahim et al., 2016).

Reliability delivery can be referred as number of products delivered on confirmed delivery date divided by number of products ordered (Schonsleben, 2016). A high standard of reliability delivery is crucial success factor in achieving customer satisfaction. Johnson and Davis (1998), posit that metrics based on delivery windows capture the most important aspect of the delivery process, which is reliability. Reliability delivery is a crucial factor of successful finished products provided by logistics service providers. Suggestion of the delivery performance is the most important metric in outbound logistics

2.3.2 On-Time Delivery

On time delivery can also be referred to as delivery precision, is a measure of process and supply chain efficiency which measures the amount of finish goods or services delivered to customers on time and in full (Levinson, 2018). It helps determine how efficiently customers' demands or returns are attended to on agreed deadlines. On time delivery is a very simple measure but sometimes overlooked in many organizations, and it is simply calculated as the amount of units or shipments delivered on time versus total orders shipped (Levinson, 2018). The most important task in delivery performance is to control the return of materials back to the point of origin. Just-in-time delivery refers to the rate in which a firm delivers products to its customers at a specific period of time (Hamzi, 2002). It could also be the internal and subjective response customers have to any direct or indirect contact with a company method of delivery (Meyer & Schwager, 2007).

Onishi and Manchanda (2012) avers that delivery process derives not only from two-way interactions between firms and customers such as marketing channels, but also from one-way communications exerted by firms such as prompt delivery, as well as indirect contacts such as home delivery. However, most marketing literature covers the delivery process with limited types of above touch-points (Ahluwalia et al., 2000; Chevalier & Mayzlin, 2006; Trusov et al., 2009). Also, the second objective of employing a better delivery time is to gain a better understanding of the holistic customer experience deriving from multiple touch-points that covers all direct and indirect contacts with the brand, focusing particularly on the consequences of customer multi touch-point experiences. Jane and Ochoa (2006) suggest that satisfaction might be shaped by holistic experiences derived from all touch-points between customers and brands.

2.4 Material Management Strategies and Service Delivery Performance

Materials management strategies should seek to reduce loss of profit due to theft, damage and wastage, as well as running out of stock. Supporting this, Ebronke and Elamah (2011) re-affirms the importance of effective management of time cost and quality in the upstream oil sector. It is also important to ensure that the right quality and quantity of materials and installed equipment are appropriately specified in a timely manner, are obtained at a reasonable cost, and are available when

needed (Bell & Stukhart, 1986 as cited in Gowon et al., 2021). A study conducted by Oyebamiji (2018) showed that material management is vital for the performance of manufacturing firms. The research aimed at assessing how material handling influences organization performance in the Nigerian cement industry.

Empirically, Rahimah et al. (2018) underscored materials management as a predictor of an organisation's delivery performance. Notwithstanding their contribution to the body of knowledge, extant studies bear inconclusive and contradictory results besides focusing on developed countries and different sectors, ignoring the oil sector. Accordingly, Rahimah et al. (2018) found that the number of sales materials days determined the profitability of Malaysian public listed companies. Additionally, the debt to equity ratio, current ratio, and firm size also significantly affected its profitability. Similarly, Capkun et al. (2019), in their study, revealed a positive correlation between a company's materials management and its financial performance. They also noted that degrees of correlation vary depending on the type of inventory and the financial performance reference. Masudin et al. (2018) also assessed materials management and procurement practices' impact on an organization's performance. They found that material management improves organisational performance.

2.4.1 Materials Handling and Service Delivery Performance

Mohsen and Hassan (2010) carried out a study to find out the best design for an efficient material handling system. The research also aimed at identifying the factors that firms should consider when developing their material handling systems. The study suggested that an efficient material handling system should consider the following factors: complexity of the system, life cycle, purpose, environment of the system, characteristics of equipment and nature of transactions (Mohsen & Hassan, 2010). Kathurima et al. (2016) did a study on the effects of materials handling systems on performance of cement manufacturing firms in Machakos County. The study has relied on smaller sample size hence, similar study can be conducted using larger sample size. Kisioya and Moronge (2019) examined the influence of material handling practices on performance of large scale processing firms in Nairobi County, Kenya. The study found that material packaging elements have an impact in overall performance of the manufacturing firms calling for the need to research on more variables of material handling. Milan and Vieira (2011) investigated the materials handling management: A case study in Indian Manufacturing sector.

2.4.2 Just-In-Time Inventory and Service Delivery Performance

The term JITI is used to refer to an operations system in which materials are moved through the system and services are delivered with clear-cut timing so that they are delivered at each stride of the process just as they are needed-hence the name just-in-time (Stevenson, 2007). Initially, the term JITI referred to the movement of materials, parts, work-in-progress and semi-finished goods within an operation system. For JITI approach to succeed, a crucial requirement is to ensure timely delivery by the vendor. This is to avoid expensive and irreparable business downtimes occasioned by any delay in materials delivery, a major operational management issue among many Nigerian manufacturers (Takim, 2014). Just-in-time, as an evolving area in scheduling, aims to improve return on investment by reducing in-process inventory and associated carrying costs. As a production scheduling strategy, JITI is indicated in single and parallel machines environments while it is beginning to be considered in the flow shop machine environment (Adamu et al, 2014). In this system, the supplier has the responsibility of delivering the components and part to the production line "Just in Time" to be assembled. Other names for just in time system is Zero stock inventory and production (Lazaridis & Dimitrios, 2005). For the just-in-time inventory strategy to work successfully the quality of the

materials must be very high because defective materials could up halt the production processes of the assembly line, there must be dependable relationships and smooth co-operation with suppliers, ideally this implies that the supplier should be located near to the company with dependable transportation available (Konke, 2003 as cited in Munyao et al., 2015).

3.0 MATERIALS AND METHOD

Research design: This study adopted cross-sectional research design.

Population: According to Nigeria Infopedia an online local business directory, there are eight (8) major oil producing firms in Rivers State. They include; Shell Petroleum Development Company of Nigeria (SPDC), Mobil Producing Nigeria Unlimited (MOPNU), Chevron Nigeria Limited (CNL), Nigeria Agip Oil Company Limited (NAOC), Total Petroleum Nigeria Limited (TPNL), Texaco Overseas Petroleum Company of Nigeria Limited (TOPCN), Belema Oil Producing Ltd (BOPL), Eroton Ltd (BL), Newcross Exploration and Production Ltd (NEPL). Since the population of the study is considerably not very large, the researcher studied all the firms that made up the population, hence, census study and no sampling was needed in this study. Five (5) respondents (Store Keepers, Inventory Managers, Purchasing Managers, Logistics Managers and IT Managers) were chosen from each of the eight (8) selected upstream oil firms in Rivers State. Structured copies of questionnaire will be used as instrument for primary data collection.

Reliability and Validity of Instruments: The researcher used simple language in questionnaires to avoid ambiguity, supervisor judgmental and reliable source of data that researcher permitted to collect data from particular respondents. Cronbach alpha was utilized to test on the answers from the pre-testing to ensure that the items in the questions and answers collected are relevant and accurate. it was resulted that material handling produced an outcome of 0.832 from four(4)statement items, followed by just-in-time inventory with an outcome of 0.881 value from four(4) statement items; delivery reliability Cronbach Alpha outcome with four(4) statement items was 0.809 and on-time delivery shows a Cronbch Alpha outcome of 0.878 value with four(4) statement items.

Data Analysis Techniques: This paper adopted Spearman Rank Order Correlation Coefficient and Partial Correlation data analysis technique with the aid of Statistical Package for Social Sciences (SPSS) version 23.0.

4.0 Results and Discussion

Forty (40) copies of questionnaire were administered among the respondents; from the copies distributed, thirty-five (35) copies corresponding to (87.5%) were returned and valid while five (5) copies corresponding to 12.5% were not collected.

Table 1: Correlation Analysis on Material Handling and Delivery Reliability, On-Time Delivery

Correlations			materials Handling	Delivery Reliability	On-Time Delivery
Spearman's rho	materials Handling	Correlation Coefficient	1.000	.905**	.946**
		Sig. (2-tailed)	.	.000	.000
		N	35	35	35
Spearman's rho	Delivery Reliability	Correlation Coefficient	.905**	1.000	.885**
		Sig. (2-tailed)	.000	.	.000
		N	35	35	35

	N	35	35	35
On-Time Delivery	Correlation Coefficient	.946**	.885**	1.000
	Sig. (2-tailed)	.000	.000	.
	N	35	35	35

** . Correlation is significant at the 0.05 level (2-tailed).

Interpretation: Table 1 above revealed the significant relationship between material handling and service delivery performance of upstream oil firms in Rivers State. Ho₁ results showed that material handling at a Pv < 0.05, significantly relate towards delivery reliability of upstream oil firms in Rivers State. From the output, it showed that material handling has a significant and positive relationship with delivery reliability at a rho = 0.905 and a P-value = 0.000; Ho₂ results showed that material handling at a Pv < 0.05, significantly relate towards on-time delivery of upstream oil firms in Rivers State. From the output, it showed that material handling has a significant and positive relationship with delivery reliability at a rho = 0.946 and a P-value = 0.000. Since P value (0.000) is less than the alpha value (0.05%) which is level of significance, Ho₁ and Ho₂ were rejected.

Table 2: Correlation Analysis on Just- In-Time Inventory and Delivery Reliability, On-Time Delivery

Correlations

			Just-In-Time Inventory	Delivery Reliability	On-Time Delivery
Spearman's rho	Just-In-Time Inventory	Correlation Coefficient	1.000	.844**	.949**
		Sig. (2-tailed)	.	.000	.000
		N	35	35	35
	Delivery Reliability	Correlation Coefficient	.844**	1.000	.885**
		Sig. (2-tailed)	.000	.	.000
		N	35	35	35
	On-Time Delivery	Correlation Coefficient	.949**	.885**	1.000
		Sig. (2-tailed)	.000	.000	.
		N	35	35	35

** . Correlation is significant at the 0.05 level (2-tailed).

Interpretation: Table 2 above revealed the significant relationship between just-in-time inventory and service delivery performance of upstream oil firms in Rivers State. Ho₃ results showed that just-in-time inventory at a Pv < 0.05, significantly relate towards delivery reliability of upstream oil firms in Rivers State. From the output, it showed that just-in-time inventory has a significant and positive relationship with delivery reliability at a rho = 0.844 and a P-value = 0.000; Ho₄ results showed that just-in-time inventory at a Pv < 0.05, significantly relate towards on-time delivery of upstream oil firms in Rivers State. From the output, it showed that just-in-time inventory has a significant and positive relationship with delivery reliability at a rho = 0.949 and a P-value = 0.000. Since P value (0.000) is less than the alpha value (0.05%) which is level of significance, Ho₃ and Ho₄ were rejected.

4.1: Discussion of Findings

Material handling significantly and positively correlates with service delivery performance and as such enhances its measures (delivery reliability and on-time delivery).

Hypothesis one (H_{01}) was designed to examine the significant relationship between material handling and delivery reliability. Material handling was hypothetically tested against delivery reliability using Spearman Rank Order Correlation Coefficient analysis tool. The analysis was aimed to examine the relationship between material handling and delivery reliability for which result showed that a significant relationship exist between the variables ($Rho = 0.905$). It further revealed the existence of a strong and positive significant relationship between the variables. The second hypothetical statement (H_{02}) was designed to examine the relationship extent between material handling and on-time delivery. The result revealed the existence of a significant relationship between material handling and on-time delivery ($R = 0.946$). Our analysis showed the existence of a strong and positive significant relationship between variables.

The findings reiterate the views of scholars such as Odhiambo (2015) investigation who established that material handling positively and significantly related with service delivery performance. Study by Patlins (2016) also in support of this present findings that, material handling has a positive correlation with performance. More so, Mohsen and Hassan (2010) found that material handling significantly influence firm performance and this findings is in line with our results.

Just-in-time inventory has a significant and positive influence on service delivery performance and as such enhances its measures (delivery reliability and on-time delivery).

Hypothesis three (H_{03}) was designed to examine the significant relationship between just-in-time inventory and delivery reliability of upstream oil firms in Rivers State. Just-in-time inventory was hypothetically tested against delivery reliability using Spearman rank analysis tool. The analysis was aimed to examine the relationship between just-in-time inventory and delivery reliability for which result showed that a significant relationship exist between the variables ($R = 0.844$). It further revealed the existence of a strong and positive significant relationship between the variables. The fourth hypothetical statement (H_{04}) was designed to examine the relationship extent between just-in-time inventory and on-time delivery. The result revealed the existence of a significant relationship between the variables ($R = 0.949$). Our analysis showed the existence of a strong and positive significant relationship between variables.

Some empirical findings confirm a positive relationship between just-in-time inventory and service delivery performance as did ours e.g. It has largely been found to improve service delivery performance in areas of operational flexibility, dependability, speed while minimizing materials related costs (Inman & Green, 2018; Nawanir et al., 2016). Other studies similarly found JITI to positively influence delivery performance in terms of timely deliveries, waste elimination, increased productivity while improving demand management (Panwar et al., 2017; Yadav et al., 2019; Sharma & Modgil, 2019).

5.0 Conclusions

The findings on the dimensions of material management strategies, namely material handling and just-in-time inventory all contribute significantly towards achieving service delivery performance of upstream oil firms in Rivers State.

- The results on the relationship between material handling and service delivery performance indicated “*strong and positive relationship*”.

- Premised on the second research question, the study concludes that a “*strong and positive significant relationship*” exist between just-in-time inventory and service delivery performance of upstream oil firms in Rivers State.

Based on the findings as revealed in the study, hence, concluded that material management strategies has an impact positive on service delivery performance.

5.1 Recommendations

Based on the finding of this study, it is justified that material management strategies have a direct positive impact on service delivery performance of upstream oil firms.

1. Manager of upstream oil firms are expected to consider material management strategies as a one core enterprise objective in order to excel their competitiveness through providing material handling, just-in-time inventory and enterprise resource planning, meet market demand in a flexible manner, and also enhance their overall organizational performance.
2. Upstream oil firms need to have the necessary skills and knowledge about the use of scientific material management techniques and decision models.
3. It is recommended that, pragmatic measures be adopted to implement efficient and effective inventory management software.
4. A decentralized database system (material management software) such as RFID, SAP, ERP, Barcode technology and EDI be put in place to enable suppliers of upstream oil firms monitor the stock movement at any given time in order to be to deliver even before expected lead times.
5. Proper forecasting techniques like Qualitative Models: Delphi Method, Experts Opinion, Consumer Market Survey, and Sales Force Composite) and Quantitative Models: such as Time-Series (Moving Average, Exponential Smoothing, and Trend Projections) and Causal Methods (Regression Analysis) should employed by upstream oil firms.

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