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# Evaluating the Impact of Electronic Payment Systems on Service Delivery: A Case Study of Warri Refining Petroleum Company

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**Abstract**
This study assesses the impact of electronic payment systems on service delivery at Warri Refining Petroleum Company (WRPC). Using a survey research design, data were collected from 250 participants through structured questionnaires and analyzed with SPSS. The findings indicate that the adoption of e-payment systems has significantly improved service delivery by reducing transaction turnaround times, enhancing customer satisfaction, and minimizing the risks associated with physical cash handling. Key benefits include increased convenience, reduced waiting times, and overall cost savings. Despite some challenges such as frequent service issues and security concerns, the study demonstrates the substantial positive effects of e-payment systems. Also, further investment in technology and increased customer education to optimize the benefits of electronic payments in the oil and gas industry.

**Keywords:** Electronic Payment Systems, Service Delivery, Oil and Gas Industry, Customer Satisfaction, Warri Refining Petroleum Company

## Introduction

One of the most significant advancements in the Nigerian payment system is the adoption of electronic payment systems. These systems, as defined by Oyelami et al. (2020), involve monetary transactions conducted over a network of computers. They encompass a range of services and transfers made through devices such as telephones, computers, the internet, Automated Teller Machines (ATMs), smart cards, and Visa cards. This paperless system offers an alternative to traditional payment methods, which rely heavily on cash and cheques. In this electronic era, currency and notes are converted into data, and transmitted through telephone lines and satellite transponders (Afaha, 2019). The introduction of electronic payment systems has significantly reduced financial costs and simplified funds transfers. Nigeria's payment systems have evolved remarkably, transitioning from barter trade to coins and commodity money, and now to information technology-driven instruments and systems (Iheukwumere et al., 2020). This transformation owes much to the improvements initiated by the Central Bank of Nigeria (CBN). Despite these advancements, the use of physical currency remains prevalent, with almost 70 percent of transactions conducted in cash. However, the use of cheques and other payment instruments, such as cards, has increased significantly in recent years. Recognizing the importance of a functional payments system to monetary policy implementation, the CBN continually takes steps to ensure the system's smooth operation and development (Okifo & Igbunu, 2015).

The oil and gas industry plays a vital role in the economic development of any nation. Recently, the sector has become more sophisticated, requiring adaptation to emerging environmental challenges. As a dynamic industry, the oil and gas sector must seek ways to meet new challenges. Today, competition has forced traditionally conservative industries to abandon slow reaction times and long-established practices to seize business opportunities and respond to customer requests swiftly (Ayo, 2011; Bagudu & Okolie, 2022). Many banks have repositioned themselves by providing e-payment services to enhance banking service delivery within the oil and gas sector. Clients are increasingly willing to switch banks if they identify gaps in service delivery from their current providers (Abdulla et al., 2015). Against this backdrop, this study aims to assess the role of electronic payment systems in improving service delivery in the oil and gas industry, focusing on the case of Warri Refining and Petrochemical Company (WRPC).

Nigeria, as a developing economy, is striving to keep pace with global advancements in electronic payment systems. While electronic payments are not entirely new to the Nigerian market, there has been a notable emphasis on card-based solutions with limited penetration into web and mobile payment methods (Aborisade,


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2014). Currently, ATMs are the most visible form of e-payment in Nigeria, though they are primarily used for cash withdrawals rather than for transactional payments. Banks have promoted ATM usage to alleviate the long queues typical of traditional banking halls (Aborisade, 2014).

In Nigeria, as in many developing nations, cash remains the dominant mode of payment, with a significant portion of the population remaining unbanked, contributing to a predominantly cash-based economy (Akanle et al., 2014). For economic development, it is crucial to foster a payment system that is secure, convenient, and affordable. In alignment with global payment trends, the Nigerian Federal Government introduced an e-payment policy in 2009 for transactions involving Federal Ministries, Departments, and Agencies (MDAs). This policy replaced cheques with electronic payments for salaries and other financial transactions, aiming to enhance transparency, accountability, and reduce corruption. E-payment, as part of e-governance, involves electronic transactions without requiring physical presence at banks or government offices (Ogedebe & Babatunde, 2012). Despite these advancements, the shift to electronic payment systems faces significant challenges, including inadequate infrastructure, security concerns, high illiteracy rates, and resistance to technological change. Commercial banks, as key stakeholders, are expected to support this transition (Akinola, 2018).

**The Concept of E-Payment**

Electronic payment (e-payment) facilitates the transaction of business and settlement of financial obligations electronically, enabling a cashless society. This payment system encompasses a network of institutions, instruments, rules, procedures, standards, and technological means that enable the transfer of monetary value between parties involved in mutual transactions. Governed by legal and regulatory frameworks, e-payment systems link bank accounts and support monetary exchanges using electronic deposits (Summers, 2012). The system utilizes cash substitutes, incorporating electronic money and ICT tools. Traditionally, payment systems relied on negotiable instruments such as cheques and letters of credit, but the rise of electronic communication has introduced various alternatives like debit and credit cards, electronic funds transfers, direct credits, direct debits, internet banking, and e-commerce payments (Okifo & Igbunu, 2015). E-payment systems are integral to both domestic and international transactions, predominantly provided by banks and financial institutions.

Nwankwo and Eze (2013) define e-payment systems as automated processes that facilitate the exchange of monetary values through ICT networks. The Nigerian transition to a cashless payment system aligns with global payment trends, enhancing the effectiveness and stability of the financial sector. A cashless system is characterized by transactions that occur without physical currency, instead relying on credit cards or electronic fund transfers (Nwankwo & Eze, 2013). The Internet, a crucial tool in modern economies, has significantly impacted banking practices, leading to the global popularity of e-banking services, although their adoption in developing countries like Nigeria has been slower (James, 2012). E-banking, as defined by Daniel (1999), involves providing banking services via the Internet, including mobile banking, video banking, fund transfers, e-payments, and ATM services. While ATM services are the most prevalent in Nigeria, technological advancements continue to expand e-banking options. As of today, all Nigerian deposit money banks offer various e-banking services. According to Agba (2010), e-payment in Nigeria allows for the electronic transfer of payments, including salaries and supplier payments, with minimal manual intervention.

Every society, including primitive ones, has developed a payment system for settling personal and business transactions domestically and internationally. These systems, which are the oldest and most crucial parts of the financial framework, have evolved incrementally over centuries. This evolution, driven by the necessity to meet various transactional challenges, has transitioned from barter trade to the use of fiduciary money, such as gold and paper currency, and eventually to modern banking institutions regulated by central banks (Iheukwumere et al., 2020). Evaluating the efficiency of a payment system revolves around key operational issues such as speed, convenience, and reliability. Cash payments, while fast and reliable, are inconvenient for large amounts. Conversely, non-cash payment instruments like cheques and drafts offer convenience but often lack speed and reliability. An efficient payment system incorporates institutions, instruments, and procedures that enable economic agents to meet their financial obligations with minimal delay and cost, thereby enhancing overall economic efficiency (Sanni, 2014).

The information age of the 20th century significantly influenced business operations by making information digitization and transmission faster and cheaper. This advancement led to the creation of electronic payment systems (e-payments), which reduce transaction costs and eliminate physical barriers to financial transactions. E-payment systems, which convert currency notes into data transmitted through telecommunications networks, have transformed financial transactions and fostered the growth of e-commerce and innovative financial services (Sanni, 2014).


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Nigeria's payment system, like many others worldwide, is dynamic and influenced by changes in institutions, instruments, and participants. From its historical basis in barter trade, Nigeria's system evolved through various forms of commodity money and was significantly reformed with the establishment of the Central Bank of Nigeria (CBN) in 1958. Despite the dominance of cash transactions, the use of cheques and other payment instruments has grown steadily, supported by the introduction of electronic banking technologies and initiatives like the Magnetic Ink Character Recognition (MICR) program, the Nigerian Inter-Bank Settlement System, and the Nigerian Automated Clearing System (NACS). The digital revolution has fundamentally changed the landscape of financial services, shifting from traditional brick-and-mortar banking to electronic platforms. This transformation enables customers to conduct banking transactions through digital interfaces such as PCs, web browsers, and mobile devices. The shift to electronic payment systems includes internet banking, mobile banking, and electronic funds transfers (Agba, 2010). To fully leverage the benefits of digital payment systems, Nigeria must focus on adopting advanced technologies, enhancing security measures, and promoting public awareness and trust in digital financial services.

**Statement of the Problem**

Despite the inherent advantages and opportunities offered by electronic payment systems, their acceptability and awareness among the Nigerian populace are still very low. What prompted the researcher to carry out this research on an assessment of electronic payment systems as a strategy for effective service delivery in Nigerian oil and gas industries, is that the Nigerian populace is not aware of the importance, nature and efficiency of electronic payment systems in Nigeria. Furthermore, the electronic payment systems are also faced with some problems which include; some marketers in the petroleum industry are not satisfied with the deployment of electronic payment systems in Nigerian banking service, threats to the security and integrity of the scheme, threats of card counterfeits as well as unauthorized access or modification. Some local oil marketers believe that the e-payment system has no impact on oil and gas service delivery. All these problems will be critically examined and possible recommendations will be made for improvement in the system. This will further enhance service delivery in the oil and gas banking system.

**Objectives of the Study**

1. To assess how the e-payment system has impacted on oil and gas service delivery,
2. To determine the level of client satisfaction as a direct deployment of electronic payment systems and
3. To examine the efficiency of electronic payment systems.

**Research Questions**

1. Does the e-payment system have an impact on oil and gas service delivery?
2. Does the deployment of electronic payment systems provide any client (customer) satisfaction?
3. Is the use of electronic payment systems in the Nigerian oil and gas industry efficient towards the satisfaction of oil and gas service delivery?

**Materials and Methods**

The study employed a survey research design to evaluate the impact of electronic payment systems on service delivery within the oil and gas industry, specifically at Warri Refining Petroleum Company (WRPC). This design was chosen due to its ability to collect data from a diverse group of respondents, reflecting a range of perspectives and experiences related to e-payment systems. The population of the study focused on customers and staff at WRPC, recognizing the unique context of the oil and gas sector. A random sampling technique was used to select 250 individuals, including both customers and staff members, to ensure a representative sample for the research. This method allowed for a comprehensive analysis of perceptions and experiences related to electronic payment systems at WRPC. Data collection was carried out using structured questionnaires, which were administered personally by the researcher during five visits to WRPC. Primary data was gathered from these questionnaires, and the responses were analyzed using the Statistical Package for Social Sciences (SPSS). The analysis involved calculating the arithmetic mean and mean deviation to address the research questions and objectives, providing a detailed understanding of the effectiveness and efficiency of e-payment systems in enhancing service delivery.

**Results**

Descriptive analysis in the context of assessing the electronic payment system's impact on service delivery at Warri Refining Petroleum Company (WRPC) involves summarizing and interpreting data collected from 246 customers through structured questionnaires. Utilizing the Statistical Package for Social Sciences (SPSS) for data analysis, this approach focuses on presenting the central tendencies, variations, and patterns within the


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dataset. Key findings highlighted that the deployment of electronic payment systems significantly benefits customers by improving service quality, reducing transaction turnaround times, and enhancing overall convenience and cost-efficiency. Additionally, the descriptive analysis revealed a renewal of public confidence in banking services and increased professionalism in the sector. These insights are crucial for understanding the customers' satisfaction levels and the operational efficiency of electronic payment systems in the oil and gas industry, providing a foundation for further inferential statistics and strategic recommendations.

**Table 1:** Descriptive analysis of the impact of e-payment system on Oil and Gas service delivery

| S/No. | Questionnaire Items | SA | A | UN | D | SD | Mean | Std |
|---|---|---|---|---|---|---|---|---|
| 1 | You are aware of the effectiveness and efficiency of electronic payment systems | 52 | 87 | 31 | 9 | 67 | 3.43 | 1.467 |
| 2 | You have subscribed to ATM services as your preferred type of e-payment service | 81 | 29 | 72 | 48 | 16 | 3.62 | 1.225 |
| 3 | You have subscribed to Internet Banking services as your preferred type of e-payment service. | 5 | 20 | 75 | 64 | 82 | 3.78 | 1.058 |
| 4 | You have subscribed to Mobile Banking services as your preferred type of e-payment service. | 39 | 38 | 37 | 72 | 60 | 3.31 | 1.397 |
| 5 | E-payment systems have reduced the risk and inconvenience associated with carrying physical cash | 91 | 70 | 44 | 35 | 6 | 3.78 | 1.180 |

Source: Field survey, 2016

**Table 2:** Descriptive analysis of whether the deployment of electronic payment systems provides any customer satisfaction

| S/N | Questionnaire Items | SA | A | UN | D | SD | Mean | Std |
|---|---|---|---|---|---|---|---|---|
| 1 | Your normal service delivery before the deployment of the e-payment system was very poor | 102 | 40 | 54 | 46 | 12 | 3.73 | 1.266 |
| 2 | The introduction of an electronic payment system reduced the queue and time spent in the banking hall. | 63 | 65 | 58 | 22 | 38 | 3.33 | 1.380 |
| 3 | The electronic payment system has brought about any positive change in the service delivery of your industry. | 75 | 52 | 67 | 31 | 21 | 3.48 | 1.297 |
| 4 | The deployment of electronic payment systems offers great benefits to the customers. | 64 | 69 | 54 | 41 | 18 | 3.46 | 1.253 |
| 5 | The deployment of e-payment services has improved the way you are been served by the industry. | 55 | 78 | 51 | 32 | 30 | 3.42 | 1.294 |

Source: Field survey, 2016

**Table 3:** Descriptive analysis of the efficient use of electronic payment systems in the Oil and Gas industry

| S/No. | Questionnaire Items | SA | A | UN | D | SD | Mean | Std |
|---|---|---|---|---|---|---|---|---|
| 1 | The level of e-payment service you are currently enjoying is highly satisfied | 86 | 72 | 31 | 34 | 23 | 3.59 | 1.371 |
| 2 | You experience problems using your e-payment service frequently. | 30 | 43 | 52 | 50 | 71 | 3.37 | 1.368 |
| 3 | You rely on e-payment services for your usual business transactions. | 13 | 28 | 61 | 72 | 72 | 3.69 | 1.163 |
| 4 | The e-payment system reduces errors and increases the speed of operation in the industry. | 78 | 66 | 46 | 25 | 31 | 3.50 | 1.371 |
| 5 | The adoption of e-payment products and services increases your bank transactions. | 80 | 70 | 51 | 25 | 20 | 3.62 | 1.273 |

Source: Field survey, 2016


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The impact of the e-payment system on Oil and Gas service delivery.
Table 1 above shows that questionnaire items 1, 2, 3, 4 and 5 having 3.43, 3.62, 3.78, 3.31 and 3.78 respectively indicate that the majority of the respondents agree that they are aware of the effectiveness and efficiency of electronic payment systems, the majority of the respondents also subscribed to Internet banking system, mobile banking and ATM services as their preferred type of e-payment services. The table further indicates that the majority of the respondents agreed that the E-payment systems have reduced the risk and inconvenience associated with carrying physical cash.

The deployment of electronic payment systems and customer satisfaction.
Table 2 above shows that questionnaire items 1, 2, 3, 4 and 5 having 3.73, 3.33, 3.48, 3.46 and 3.42 respectively indicate that the majority of the respondents agree that their banking service delivery before the deployment of the e-payment system was very poor, The introduction of electronic payment system reduced the queue and time spent in the banking hall, The electronic payment system has brought about any positive change in the service delivery of your bank. The majority of the respondents also agreed that the deployment of electronic payment systems offers great benefits to the bank's customers. The table also shows that the majority of the respondents agreed that the deployment of e-payment services has improved the way you are been served by the bank.

The efficiency of electronic payment systems in the Nigerian Oil and Gas Industry
Table 3 above shows that questionnaire items 1, 2, 3, 4 and 5 having 3.59, 3.37, 3.69, 3.50 and 3.62 respectively indicate that the majority of the respondents agree that the level of e-payment service they are currently enjoying is highly satisfactory, The introduction of electronic payment system reduced the queue and time spent in the banking hall, they also agreed that they experience problems using your e-payment service frequently. The table further shows that few of the respondents rely on e-payment services for their usual business transactions. The majority of the respondents also agreed that the e-payment system reduces errors and increases the speed of operation in banking. The table also shows that the majority of the respondents agreed that the adoption of e-payment products and services increases your bank transactions.

**Discussion**

This section presents an objective analysis of the questionnaires administered to assess the impact of electronic payment systems on service delivery at Warri Refining Petroleum Company (WRPC). The chapter includes sections on the characteristics of respondents, data presentation and analysis, research questions, and a summary of findings. Out of 250 questionnaires distributed, 246 were filled and returned, and the analysis encompasses the entire set of returned questionnaires. The descriptive analysis aims to summarize and interpret the data collected from 246 respondents using structured questionnaires, analyzed through the Statistical Package for Social Sciences (SPSS). This section examines key aspects of the data to provide insights into the deployment and impact of electronic payment systems at WRPC. The descriptive analysis in Table 1 highlights respondents' awareness and adoption of various e-payment services. Key findings indicate that a majority of respondents are aware of the effectiveness and efficiency of electronic payment systems, with mean scores ranging from 3.31 to 3.78 across different items. Most respondents prefer Internet banking, ATM services, and mobile banking, underscoring the widespread acceptance of these technologies. Additionally, respondents noted that e-payment systems have reduced the risk and inconvenience associated with carrying physical cash, contributing to improved service delivery and customer satisfaction.

Table 2 addresses the research question regarding customer satisfaction. The data reveals that the introduction of e-payment systems has notably improved service delivery in the oil and gas sector. The majority of respondents agreed that service delivery was poor before the deployment of e-payment systems, with a mean score of 3.73. The implementation of these systems has reduced queues and waiting times in banking halls, evidenced by a mean score of 3.33. Respondents also acknowledged positive changes in service delivery and significant benefits to customers, reflected in mean scores of 3.48 and 3.46, respectively. Table 3 focuses on the efficiency of e-payment systems in the oil and gas industry. Respondents generally expressed high satisfaction with the current level of e-payment services, with a mean score of 3.59. However, some respondents reported frequent problems using e-payment services, indicated by a mean score of 3.37. Despite these issues, a significant number of respondents rely on e-payment services for regular business transactions, with a mean score of 3.69. The analysis further shows that e-payment systems enhance operational speed and reduce errors, and the adoption of e-payment products increases bank transactions, with mean scores of 3.50 and 3.62, respectively.

The analysis demonstrates that the deployment of electronic payment systems at WRPC has substantially improved service delivery, customer satisfaction, and operational efficiency. These systems have reduced transaction turnaround times, minimized the risks associated with physical cash handling, and enhanced the


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overall banking experience for customers. The findings align with previous studies that highlight the transformative impact of e-payment systems on financial services, emphasizing the need for continued investment in technology, customer education, and security measures to further optimize service delivery in the oil and gas industry.

**Conclusion**

The study assessed the effect of electronic payment systems (e-payments) on service delivery at Warri Refining Petroleum Company (WRPC). Using a survey design, 250 participants were involved, and data were gathered through structured questionnaires and analyzed via SPSS. Results indicated that e-payment systems significantly improved service delivery by shortening transaction times, reducing the risks associated with handling cash and enhancing customer satisfaction. Respondents reported better service quality, shorter waiting times, and greater convenience due to the implementation of e-payment technologies, though they also highlighted recurring service disruptions. The research concluded that e-payment systems have positively impacted service delivery at WRPC by promoting cost efficiency, boosting operational effectiveness, and increasing customer satisfaction. While challenges like security concerns and the need for customer education persist, the advantages of e-payment systems are evident. Highlights the ongoing trend toward digital transactions in the industry and recommends continued investment in technology and public awareness to optimize the use of e-payment systems.

**References**


Abdulla, A., Abubakr, A., Ismaeel, M., & Mahmud, H. (2015). E-payment: prospects, challenges and solutions in KRG public sector. *International Journal of Engineering and Computer Science*, 4(9), 14092-14097.

Aborisade, R. (2014). The future of consumer payments in Nigeria: An evaluation of the e-payment system vision-2020 of the Nigerian government and nation's banking sector. *Journal of Emerging Trends in Computing and Information Sciences*, 5(3), 220-229.

Afaha, J. S. (2019). Electronic payment systems (E-payments) and Nigeria Economic Growth. *European Business & Management*, *5*(6), 68-78. https://doi.org/10.11648/j.ebm.20190506.11

Agba, D. (2010). *Implications and challenges of e-payment system*. Retrieved from file: http//www.itnewafrica.com

Akanle, O., Adebayo, K., & Adetayo, O. (2014). Fuel subsidy in Nigeria: Contexts of governance and social protest. *International Journal of Sociology and Social Policy*, *34*(1/2), 88-106. https://doi.org/10.1108/IJSSP-01-2013-0002.

Akinola, A.O. (2018). *Oil Sector Reform and the Scourge of Corruption*. Globalization, Democracy and Oil Sector Reform in Nigeria. https://doi.org/10.1007/978-3-319-70184-4

Ayo, A. O. (2011). Emergence of payment systems in the era of e-commerce in Nigeria: Problems and Prospects. *Delta Business Education Journal*, 1 (6), 64-72.

Bagudu, I. G. & Okolie, U. C. (2022). Analysis of Prospects and Challenges of E-Payment System in Nigeria. *Journal of Business*. 11(1), 22-37.

Daniel, E. (1999). Provision of electronic banking in the UK and the republic of Ireland. *International Journal of Bank and Marketing*, 17(2), 72-82.

Iheukwumere, O. E., Moore, D., & Omotayo, T. (2020). Investigating the challenges of refinery construction in Nigeria: A snapshot across two-timeframes over the past 55 years. *International Journal of Construction Supply Chain Managemen*t. 10 (1), 46-72. https://doi.org/10.14424/ijcscm100120-46-72

James, A.O. (2012). The acceptance of e-banking by customers in Nigeria. *World Review of Business Research*, 2(2), 6-8.

Nwankwo, O., & Eze, O. R. (2013). Electronic payment in cashless economy of Nigeria: problems and prospect. *Journal of Management Research*, 5(1), 138-151.

Ogedebe, P. M., & Babatunde, P.J. (2012). E-payment: Prospects and challenges in Nigerian public sector. *International Journal of Modern Engineering Research (IJMER)*, 2 (5), 3104-3106.

Okifo, J., & Igbunu, R. (2015). Electronic payment system in Nigeria: Its economic benefits and challenges. *Journal of Education and Practice*, 6(16), 56-62.

Oyelami, L. O., Adebiyi, S. O., & Adekunle, B.S. Electronic payment adoption and consumers' spending growth: empirical evidence from Nigeria. *Futur Bus J* 6, 14 (2020). https://doi.org/10.1186/s43093-020-00022-z

Sanni, I. M. (2014). The implications of price changes on petroleum products distribution in Gwagwalada Abuja, Nigeria. *Journal of Energy Technology and Policy*, *4*(7), 1-7.

Summers, B. J. (2012). *Payment system: Design, governance and oversight*. London: Central Banking Publications.




*Cite this article as*:
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