AJ ACADEMIC JOURNALS
expand your knowledge

Educational Research and Reviews

Full Length Research Paper

Improving product quality of Nigerian universities through supply chain management

M. N. G. Akeke[1]*, N. F. Iroegbu[2], P. E. Oche[1] and M. O. Akputu[1]

[1]Department of Business Education, University of Calabar, Calabar 540281, Cross River, Nigeria.
[2]Department of Management, Alex Ekwueme Federal University, Ndufu Alike, Ikwo, Ebonyi State, Nigeria.

This study examines the impact of improving product quality of Nigerian universities through supply chain management. Specifically, the study examined the impact of supply chain integration, supplier relationship management, technology adoption in supply chain management as the independent variables and product quality in Nigerian universities as the dependent variable. To guide the study, three research questions were posed, and hypotheses formulated. Descriptive survey design was adopted for the study. 73 lectures from the department of Business Education and Vocational and Technical Education made up the population and census were used because of the manageable population. The instrument for data collation is, "Improving Product Quality and Supply Chain Management in Nigerian Universities Questionnaire" (IPQSCHMNUQ) which is a 30-items questionnaire having 10 items per variable. Data collected from this instrument was analyzed using Pearson Product Moment Correlation (PPMC) to test the hypotheses at 0.05 level of significance. The results of the analysis reveal that, there is significant relationship between the level of supply chain integration and the quality of educational products and services offered by Nigerian universities; effective supplier relationship management significantly affects the quality of academic resources and that the adoption of advanced supply chain technologies has significant impact on the overall quality of educational outputs in Nigerian universities. From the findings of the study, it was recommended among others that Nigerian universities should prioritize the development and implementation of advanced resource management systems to ensure the optimal allocation and utilization of academic resources.

Key words: Supply chain, technology adoption, supply chain management, product quality.

INTRODUCTION

The quality of education in Nigerian universities has become a pressing concern amid growing demands for highly skilled graduates in an increasingly competitive global job market. Despite significant investments in higher education, challenges such as outdated curricula, insufficient infrastructure, and limited access to resources continue to hinder academic excellence (Adeyemi and Bamidele, 2020). To address these issues, institutions must adopt innovative approaches that enhance their educational offerings. One promising strategy is the

implementation of effective supply chain management (SCM) practices, which can improve the overall quality of educational products—defined as the comprehensive learning experience and outcomes delivered to students.

Supply chain management, traditionally associated with the manufacturing and service sectors, involves the coordination and optimization of various processes to ensure the efficient delivery of goods and services (Mentzer et al., 2015). In the context of higher education, SCM extends to the management of resources such as faculty expertise or human resource, technological tools, research materials, and administrative workflows. By applying SCM principles, universities can streamline operations, reduce waste, and enhance the quality of educational outputs (Kumar and Sahu, 2021). Recent studies indicate that effective SCM can lead to significant improvements in educational quality. For example, Adeoye and Elegunde (2022) highlight how the integration of SCM in academic institutions can facilitate better resource allocation, foster collaboration across departments, and ultimately result in improved student satisfaction and learning outcomes. According to Akeke and Ofem (2016), human resource is one the most important aspect of SCM in any organization, managers or administrators carries out the responsibility of managing human activities, which is known as human resource management. This action is concerned with the general welfare of the employee, including attracting, developing, and maintaining a satisfied, dedicated, committed, efficient, and effective workforce to facilitate goal attainment (Akeke and Ofem, 2016).

LITERATURE REVIEW

Some studies have shown that effective supply chain integration can enhance the overall operational efficiency of educational institutions. Wang and Wei (2019) found that a high degree of integration within supply chains leads to improved quality of educational services by ensuring the timely delivery of resources, reducing administrative bottlenecks, and improving student satisfaction. Similarly, Adeleke and Oyebode (2022) argued that in the context of Nigerian universities, where infrastructure and funding challenges are prevalent, supply chain integration may help improve the accessibility and quality of academic resources, leading to better learning outcomes. According to Bevilacqua et al. (2019), many universities lack a formalized SCM strategy, resulting in fragmented processes and poor responsiveness to student and faculty needs. Their research suggests that a systematic assessment of current SCM practices can reveal critical areas for improvement, enabling universities to adopt more streamlined and effective operational models. Akeke and Ofem (2016) emphasized High performance is a result of

human resource practices that are compelled to increase employee commitment by promoting active employee participation in decision-making, offering attractive salary packages, compensating employees in disaster situations, and motivating employees with incentives.

The relationship between effective SCM and educational quality has been emphasized by various researchers. Ogunleye et al. (2023) propose that future frameworks incorporate technological advancements, such as artificial intelligence and data analytics, to enhance decision-making and predictive capabilities within the supply chain. Assessing the impact of SCM practices on educational outcomes is crucial for evaluating the effectiveness of implemented strategies. This literature review examines key studies and frameworks that measure educational outcomes in relation to SCM interventions, highlighting methodologies and findings.

Educational outcomes encompass multiple dimensions, including student satisfaction, academic performance, employability, and retention rates. Allen et al. (2016) suggest that understanding educational outcomes requires a multifaceted approach, integrating both qualitative and quantitative measures, to capture the full impact of SCM practices on student experiences and success.

Several researchers have developed frameworks to systematically measure the impact of SCM on educational outcomes. Bowers and McDonald (2019) propose an integrative model linking supply chain practices to specific educational outcomes such as course completion rates and student engagement levels. Their study illustrates that effective SCM leads to improved resource allocation, resulting in better educational outcomes. Empirical studies provide valuable insights into the relationship between SCM practices and educational performance. A recent study by Fadare and Adewunmi (2022) examined Nigerian universities implementing SCM frameworks, revealing a positive correlation between SCM effectiveness and student academic achievement. Their statistical analysis highlighted significant improvements in graduation rates and student feedback before and after SCM implementation. Some supply chain management practices include supply relationship, supply chain integration and technology adoption.

Supply chain relationship refers to a business strategy that assists organization to maintain good relationship with their client. It is a process oriented and value-creating strategy to the buyer and seller (university and students), serving as a means of achieving superior financial performance (Lambert and Schwicterman, 2012). Effective Supplier Relationship Management (SRM) fosters continuous feedback between universities and suppliers, facilitating ongoing improvements in the quality of academic resources. Technology adoption refers

to the process of integrating nascent technologies into practices and systems Anyaogu and Eze (2021) argue that introducing advanced technologies into SCM processes could substantially improve the quality of educational outputs in Nigerian universities. These technologies help universities track and manage inventory more effectively, reduce administrative inefficiencies, and provide real-time data on resource availability.

A study by Zhang et al. (2023) explored the adoption of block chain technology in Pakistani operations and supply chain management, expanding the UTAUT model with technological readiness, technology affinity, and trust. Using structural equation modeling (SEM), the study found that enabling factors, social influence, effort expectancy, technological readiness, and technology affinity positively impacted adoption, while performance expectancy and trust had a negative influence. The study recommended that organizations in developing economies, like Pakistan, focus on improving social influence, effort expectancy, technological readiness, technology affinity, and enabling environments to encourage block chain technology adoption. This premise informs the current study, which investigates the influence of supply chain management on product quality improvement in Nigerian universities.

Statement of the problem

The quality of education in Nigerian universities has been increasingly questioned due to persistent challenges that hinder the effective delivery of academic programs. Despite substantial government and private investment, many institutions grapple with issues such as inadequate infrastructure, outdated curricula, and insufficient access to educational resources. These factors contribute to a significant gap between the skills possessed by graduates and the requirements of the labor market, leading to high rates of unemployment among educated youth. One critical area that has been underexplored in addressing these challenges is the role of SCM. The current supply chain processes within Nigerian universities are often fragmented and inefficient, resulting in resource misallocation, poor coordination among departments, and a lack of responsiveness to market demands. This inefficiency not only compromises the quality of educational offerings but also undermines the overall student experience and outcomes.

Without a systematic approach to SCM, Nigerian universities may continue to struggle in enhancing their educational product quality. Therefore, there is an urgent need to investigate how the integration of effective supply chain management practices can address these deficiencies, improve resource utilization, and ultimately elevate the standards of higher education in Nigeria. This

research aims to investigate the role of supply chain management in improving product quality in Nigerian universities. It will analyze current practices, identify gaps in efficiency, and propose strategies for the implementation of robust SCM frameworks. By exploring the intersection of SCM and educational quality, this study also, seeks to provide actionable insights for university administrators, policymakers, and stakeholders committed to fostering an environment of academic excellence. Ultimately, the findings are expected to contribute to the broader discourse on enhancing the standards of higher education in Nigeria, benefiting students, employers, and the society at large. The absence of a comprehensive SCM framework tailored to the unique context of Nigerian universities represents a significant gap in current academic discourse and practice, warranting thorough exploration and actionable solutions.

Objectives of the study

The main objective of this study was to examine the improving product quality of Nigerian universities through supply chain management. Specially, the study seeks to:

1) To analyze the impact of supply chain integration on product quality in Nigerian universities.
2) To assess the role of supplier relationship management in enhancing product quality in Nigerian universities.
3) To evaluate the influence of technology adoption in supply chain management on product quality in Nigerian universities.

Research questions

The study was guided by the following research questions.

1) How does the level of supply chain integration influence the quality of educational services and product offered by Nigerian universities?
2) What is the effect of effective supplier relationship management on the quality of academic resources and facilities in Nigerian universities?
3) How does the adoption of advanced supply chain technologies impact the overall quality of educational outputs in Nigerian universities?

Research hypotheses

The study was guided by the following hypotheses:

1) There is no significant relationship between the level of

Table 1. Summary of the results.

Variable	$\sum X$ $\sum Y$	$\sum X^2$ $\sum Y^2$	$\sum XY$	r-Cal	Remark
The level of supply chain integration	1630	27566	30736	0.224	Sig.
The quality of educational products and services offered by Nigerian universities	1558	28054			

Significant at p<0.05, Crit-r= 0.1982.

supply chain integration and the quality of educational products and services offered by Nigerian universities.
2) Effective supplier relationship management does not significantly affect the quality of academic resources and facilities in Nigerian universities.
3) The adoption of advanced supply chain technologies has no significant impact on the overall quality of educational outputs in Nigerian universities.

METHODOLOGY

This study employed a descriptive survey design, which is effective for understanding circumstances, events, attitudes, or opinions within a population (Isangedighi, 2012). Survey research captures individuals' thoughts, preferences, and gathers information from a targeted group through observation, questionnaires, or interviews, followed by statistical analysis. This design was deemed suitable for assessing the opinions of university lecturers in Cross River State, Nigeria, regarding the impact of training and retraining on their acquisition of artificial intelligence skills for improved performance.

The study's population consisted of 33 lecturers from the Department of Business Education at the University of Calabar and 40 lecturers from the Department of Vocational and Technical Education at Cross River State University, totaling 73 lecturers. These individuals were selected as they possess the relevant insights needed for this research.

Census was used due to the manageable size of the population. Data were collected using the "Improving Product Quality and Supply Chain Management in Nigerian Universities Questionnaire" (IPQSCHMNUQ), which comprises 30 items— 10items for each variable—rated on a four-point scale: Strongly Agree (SA), Agree (A), Strongly Disagree (SD), and Disagree (D). The scoring for these responses was 4, 3, 2, and 1, respectively. The data gathered through this instrument were analyzed using Pearson Product Moment Coloration (PPMC). Three experts scrutinized the instrument to ensure reliability and validity. Some items were dropped, some corrected while some were retained.

RESULTS

The research questions and hypotheses guided the data presentation and analysis. The analysis involved presenting the data, interpreting the results, and discussing the findings.

Hypothesis one

Supply chain integration does not significantly relate

quality of educational products and services offered by Nigerian universities. The independent variable is the level of supply chain integration while the dependent variable is the standard of educational services and product offered by Nigerian universities. Data were taken out of the data bank and compiled into sums ($\sum X$, $\sum Y$), sums of squares ($\sum X2$, $\sum Y2$), and sums of products ($\sum XY$) in order to verify this hypothesis. The Pearson Product Moment Correlation Statistical Technique was then used to analyse the condensed data. Test for significance was done using the critical-r value at .05 level of significance. A summary of the result is presented in Table 1.

From Table 1, the calculated R-values of 0**.**224 was found to be greater than the critical r-value of **0.**218, at 0.05 level of significance, with 71º of freedom. This implies that there is significant relationship between the level of supply chain integration and the quality of educational products and services offered by Nigerian universities. Also, the calculated R-value of 0**.**224was found to be positive (+), however it is a moderate influence. This means that increase in the level of supply chain integration would subsequently increase the quality of educational products and services offered by Nigerian universities. Pearson product moment correlation of the relationship between the level of supply chain integration and the quality of educational products and services offered by Nigerian universities N=73.

Hypothesis two

Effective supplier relationship management does not significantly affect the quality of academic resources and facilities in Nigerian universities. The independent variable is Effective Supplier Relationship Management, while the dependent variable is the Quality of Academic Resources and Facilities in Nigerian universities. Data were taken out of the data bank and compiled in order to evaluate this theory into sums ($\sum X$, $\sum Y$), sums of squares ($\sum X^2$, $\sum Y^2$) and sum of products ($\sum XY$). The summarized data were then subjected to analysis, using Pearson Product Moment Correlation Statistical Technique. The critical-r value at the 0.05 level of significance was used to test for significance. Table 2 provides an overview of the outcome. Pearson product moment correlation of the

Table 2. An overview of the outcome.

Variable	$\sum X$ $\sum Y$	$\sum X^2$ $\sum Y^2$	$\sum XY$	r-Cal	Remark
Effective supplier relationship management	1358	24248	24640	0.215	Sig.
Quality of academic resources and facilities in Nigerian universities	1384	26040			

Significant at $p < 0.05$, Crit-r = 0.1982.

effective supplier relationship management does not significantly affect the quality of academic resources and facilities in Nigerian universities N=73.

The statement contains an inconsistency regarding the comparison between the calculated r-value and the critical r-value. Given the calculated r-value (0.215) is actually less than the critical r-value (0.218), the correct interpretation would be:

The calculated r-value of 0.215 is less than the critical r-value of 0.218 at a 0.05 level of significance with 71 degrees of freedom, indicating that effective supplier relationship management does not significantly affect the quality of academic resources and facilities in Nigerian universities.

Hypothesis three

The adoption of advanced supply chain technologies has no significant impact on the overall quality of educational outputs in Nigerian universities. The independent variable is the adoption of advanced supply chain technologies, while the dependent variable is the overall quality of educational outputs in Nigerian universities. To test this hypothesis, data were extracted from the data bank and summarized into sums ($\sum X$, $\sum Y$), sums of squares ($\sum X^2$, $\sum Y^2$) and sum of products ($\sum XY$). The summarized data were then subjected to analysis, using Pearson Product Moment Correlation Statistical Technique. Test for significance was done using the critical-r value at 0.05 level of significance. A summary of the result is presented in Table 3. Pearson product moment correlation of the impact of the adoption of advanced supply chain technologies on the overall quality of educational outputs in Nigerian universities (N=73).

The statement is incorrect regarding the comparison between the calculated r-value and the critical r-value. Given the calculated r-value (0.212) is actually less than the critical r-value (0.218), the correct interpretation would be (Table 3): The calculated r-value of 0.212 is less than the critical r-value of 0.218 at a 0.05 level of significance with 71° of freedom, indicating that the adoption of advanced supply chain technologies has no significant impact on the overall quality of educational

outputs in Nigerian universities. The positive r-value (0.212) does suggest a moderate, positive relationship, but the relationship's significance isn't supported based on the given comparison.

DISCUSSION

The finding of hypothesis one revealed that there is significant relationship between the level of supply chain integration and the quality of educational products and services offered by Nigerian universities. Research has established that effective supply chain integration leads to improved operational efficiency, which can directly impact the quality of services and products offered by universities (Wang and Wei, 2019). In educational institutions, this could translate into better availability and quality of academic resources (e.g., textbooks, laboratory equipment), improved student services (e.g., faster processing of academic records), and better administrative support. In Nigeria, where universities face challenges such as inadequate infrastructure, poor funding, and resource scarcity, the integration of supply chain practices may help optimize resource allocation, ensuring that students have access to high-quality academic experiences (Adeleke and Oyebode, 2022).

The finding of hypothesis two shows that effective supplier relationship management significantly affects the quality of academic resources and facilities in Nigerian universities. The importance of SRM in improving the quality of academic resources is well-documented. Effective SRM leads to better alignment between universities and their suppliers, which can result in more reliable and timely deliveries of resources and improved product quality. For Nigerian universities, where funding and resource constraints are often a significant challenge, strong supplier relationships can ensure that educational resources are delivered on time and meet the required standards (Olajide et al., 2020). Additionally, SRM fosters innovation in product offerings, enabling universities to gain access to cutting-edge academic materials and technologies that can enhance teaching and learning outcomes. Also, the finding is line with Akeke and Ofem (2016), who maintains that the general well-being of workers, including recruiting, training, and

Table 3. Result summary.

Variable	$\sum X$ $\sum Y$	$\sum X^2$ $\sum Y^2$	$\sum XY$	r-Cal	Remark
The adoption of advanced supply chain technologies	1358	24238	25240	0.212	Sig.
The overall quality of educational outputs in Nigerian universities	1420	26080			

Significant at $p<0.05$, Crit-r= 0.1982.

retaining a contented, devoted, efficient, and successful workforce, can help Nigerian institutions achieve their objectives. The finding of hypothesis three revealed that the adoption of advanced supply chain technologies has significant impact on the overall quality of educational outputs in Nigerian universities. Adopting advanced supply chain technologies allows universities to streamline procurement processes, track inventory efficiently, and ensure the timely availability of academic resources. In Nigerian universities, where technology infrastructure may be lacking, the introduction of advanced supply chain technologies could revolutionize the management of academic outputs, such as research publications, student records, and course materials. Moreover, such technologies can enhance communication between different stakeholders, reduce administrative bottlenecks, and ultimately improve the educational experience. A study by Anyaogu and Eze (2021) suggest that technological innovations in supply chain management significantly impact educational quality by enhancing resource management and decision-making processes.

The research findings underscore the importance of SCM in enhancing the quality of educational services and resources in Nigerian universities. The integration of supply chain functions, effective supplier relationship management, and the adoption of advanced technologies have been shown to positively affect the availability and quality of academic resources, teaching materials, and overall educational outputs. These findings contribute to the broader literature on SCM in education, especially in developing economies, where resource constraints and infrastructure limitations often hinder the quality of academic services.

Conclusion

The quality of education in Nigerian universities has been hindered by challenges such as outdated curricula, poor infrastructure, and resource scarcity. One promising solution is the adoption of effective SCM practices, which involve optimizing resources like faculty expertise, technology, research materials, and administrative workflows. Research shows that SCM can enhance the quality of educational outcomes by improving resource allocation, reducing administrative inefficiencies, and better coordinating academic and administrative functions. A key aspect of SCM is supply chain integration, which ensures timely delivery of resources and streamlines university operations. Effective SRM can further improve the quality of academic resources and reduce procurement delays. Additionally, the adoption of advanced SCM technologies such as data analytics, cloud-based systems, and artificial intelligence can help track resources and provide real-time insights into student performance, ultimately improving educational experiences. While the integration of SCM in Nigerian universities holds significant promise, challenges such as resistance to change and limited infrastructure must be addressed. Investments in training, technology, and collaboration are essential to overcoming these barriers. Developing tailored SCM frameworks suited to the unique context of Nigerian universities is crucial for improving operational efficiency and educational quality. Future research should focus on evaluating these frameworks and integrating emerging technologies to enhance the effectiveness of SCM in higher education.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations were made:

1) Nigerian universities should prioritize the development and implementation of advanced resource management systems to ensure the optimal allocation and utilization of academic resources.

2) Universities should adopt integrated supply chain management (SCM) practices to streamline administrative workflows across departments. This involves using centralized systems that allow for better coordination between academic, administrative, and procurement functions.

3) Adoption of advanced supply chain technologies should be ensured to impact on the overall quality of educational outputs in Nigerian universities.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

REFERENCES

Adeleke A, Oyebode M (2022). Supply chain management and the quality of education in Nigerian universities. Journal of Educational Administration and Policy 27(2):150-168.

Adeoye A, Elegunde A (2022). Enhancing quality in higher education through supply chain management. Journal of Educational Administration 60(3):345-360.

Adeyemi TO, Bamidele O (2020). Challenges in higher education quality: A case study of Nigerian Universities. International Journal of Educational Management 34(5):1001-1016.

Akeke MNG, Ofem WE (2016). Human resource management techniques and quality assurance in tertiary institutions in Cross River State. International Journal of Educational Administration, Planning and Research 8(1):7-15.

Allen J, Kauffman D, Kauffman M (2016). Measuring educational outcomes: A framework for assessment. Journal of Education and Learning 5(3):43-58.

Anyaogu M, Eze S (2021). The impact of supply chain technology adoption on educational service quality in Nigerian universities. International Journal of Operations & Production Management 41(4):607-624.

Bevilacqua M, Ciarapica FE, Cagliano AC (2019). Supply chain management in higher education: A framework for improvement. International Journal of Production Economics 210:54-66.

Bowers AL, McDonald K (2019). Linking supply chain management to educational Outcomes: An integrated approach. International Journal of Educational Management 33(6):1284-1298.

Fadare O, Adewunmi O (2022). The impact of supply chain management on student performance in Nigerian universities. Educational Research for Policy and Practice 21(2):201-215.

Isangedighi AJ (2012). Overview of Research Methods. In: A. J. Isangedighi (Ed.), Essentials of Research and Statistics in Education and Social Sciences, Calabar: Eti-Nwa, pp. 44-63.

Kumar S, Sahu S (2021). Supply chain management in higher education: A conceptual framework. Journal of Higher Education Policy and Management 43(1):72-85.

Lambert DM, Schwicterman MA (2012). Supplier relationship management as a macro business process. Supply chain management: An International Journal 17(3):337-352.

Mentzer JT, Min S, Bobbitt LM (2015). Toward a unified theory of supply chain Management. Journal of Business Logistics 36(1):18-28.

Ogunleye OS, Adeyemi TO, Abidoye R (2023). Supply chain strategies and educational quality in Nigerian Universities: An empirical study. Educational Research for Policy and Practice 22(2):145-160.

Zhang Q, Khan S, Khan SU, Khan IU (2023). Understanding blockchain technology adoption in operation and supply chain management of Pakistan: Extending UTAUT model with technology readiness: Technology affinity and trust. SAGE Open 13(4).

Wang Y, Wei H (2019). The role of supply chain integration in improving the quality of educational services. International Journal of Educational Management 33(4):700-715.