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EFFICIENCY IMPROVEMENT STRATEGIES FOR REDUCING TRANSPORTATION COST OF EDUCATION LOGISTICS IN LAGOS STATE, NIGERIA

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Abstract

This study examined Efficiency Improvement Strategies for Reducing Transportation Costs in Education Logistics. One null hypothesis guided the study with the adoption of descriptive survey research design. The population of the study comprised of all 3514 instructors in Lagos State Education District V. A multi-stage sampling technique (simple random, purposive and disproportionate stratified sampling technique) was used in selecting 120 instructors. Data were collected through Questionnaire on Efficiency Improvement Questionnaire (EIQ), Reducing Transportation Cost Questionnaire (RTCQ), and Education Logistics Questionnaire (ELQ). The instrument was validated by an expert in the field of economics of education through face and content validity and was found reliable through Pearson's product-moment correlation coefficient at 0.72. The data collected were analysed using Pearson's Product-Moment Correlation Coefficient (PPMCC). The hypotheses formulated were tested at 0.05 level of significance. The tested hypothesis showed that there Efficiency Improvement Strategies Reduce Transportation Costs in Education Logistics, (r = -0.062; N = 120; p-value > 0.05*) in public secondary school in Lagos State Education District V. Explore the integration of technology. Based on the findings, the following recommendations among others were made, GPS tracking systems and route optimization software, to optimise transportation operations and save costs, foster collaboration and engagement with key stakeholders, including transportation providers, government agencies, and local communities, to explore novel cost-sharing methods and creative solutions.*

Keywords: Education Logistics, Efficiency Improvement Strategies, Reducing Transportation Costs.

Introduction

In today's continuously expanding educational scene, transportation plays a critical role in maintaining the proper running of educational institutions. The transportation of students, staff, and resources is vital for providing access to learning opportunities, supporting extracurricular activities, and maintaining the overall safety and well-being of everyone within the educational community (Rosário & Menezes 2010). However, the increasing expenses associated with transportation, including fuel, maintenance, and labored offer substantial financial issues for educational institutions, leading to the need for efficiency improvement techniques to cut transportation costs (Abbas & Bassam, 2018).

Researchers and practitioners in the field of education logistics have underlined the necessity of optimizing transportation operations to promote cost-effectiveness and sustainability in educational settings (Kara & Yücel, 2020). By implementing creative tactics and leveraging sophisticated technologies, educational institutions can streamline their transportation procedures, save expenses, and boost overall operational efficiency (Desrosiers et al, 2012).

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Several studies have stressed the potential benefits of route optimization in decreasing transportation expenses for educational institutions. By employing sophisticated algorithms and real-time data analysis, businesses can find the most economical routes for delivering students and supplies, hence minimising fuel consumption and vehicle wear and tear (Chavoya, Paola & Ambient, 2021). Additionally, collaborative transportation options, such as ride-sharing programs and partnerships with other institutions, have been found to have cost-saving potential through resource pooling and better operational efficiency (Herrera et al., 2019).

Despite the growing recognition of the relevance of transportation optimization in education logistics, there is a need for further research to explore and assess the effectiveness of alternative efficiency improvement measures in decreasing transportation costs for educational institutions. This study tried to fill this gap by exploring the many techniques that may be used to promote cost-effectiveness and efficiency in transportation operations within educational environments.

Through a comprehensive review of existing literature, analysis of case studies, and interviews with transportation experts and education administrators, this research aims to provide valuable insights and practical recommendations for optimizing transportation operations and reducing costs in educational institutions. By identifying the most successful tactics and best practices in education logistics, this study intends to contribute to the improvement of transportation management in the field of education and support the sustainability and financial viability of educational institutions.

Despite the growing recognition of the importance of transportation optimization in education logistics, educational institutions continue to face significant transportation costs due to factors such as fuel prices, vehicle maintenance expenses, labor costs, and traffic congestion (Abbas et al.,2018). These costs can have a significant impact on the financial performance of educational institutions, leading to a need for efficiency improvement strategies to reduce transportation costs (Desrosiers et al., 2012).

The increasing costs associated with transportation have led to a growing need for educational institutions to explore and implement strategies to optimize their transportation operations and minimize expenses. However, there is a lack of comprehensive research on the most effective efficiency improvement strategies for reducing transportation costs in education logistics, making it challenging for educational institutions to make informed decisions regarding transportation management (Kara & Yücel, 2020).

This study aims to address this gap by exploring and analyzing various efficiency improvement strategies for reducing transportation costs in education logistics, including route optimization, fleet management, collaborative transportation, and alternative transportation modes (Chavoya et al., 2021). By examining existing literature, analyzing case studies, and conducting interviews with transportation experts and education administrators, this study aims to provide valuable insights and practical recommendations for optimizing transportation operations and reducing costs in educational institutions.

Purpose of the Study

The purpose of this study is to examine the *efficiency improvement strategies for reducing transportation* costs *of education logistics in Lagos State, Nigeria*.

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Research Hypothesis

The null hypothesis was formulated and tested in this study

H_{01}: There is no significant relationship between the implementation of efficiency improvement strategies and the reduction of transportation costs in education logistics.

Transportation Cost and Education Logistics

Transportation costs and education logistics are essential aspects of the broader educational landscape. They encompass the various factors that contribute to the efficient delivery of educational services and the overall well-being of students, teachers, and institutions.

Transportation Costs

Transportation costs is said to be expenses incurred in moving people, goods, and services from one place to another. In the context of education, these costs are associated with the movement of students, teachers, and educational materials between home, school, and other related locations. A study by the National Center for Education Statistics (NCES) in the United States found that transportation costs accounted for 2.4% of total expenditures in public elementary and secondary schools during the 2017-2018 academic year (NCES, 2020).

Several factors can influence transportation costs, including the distance between homes and schools, the size and configuration of the school district, fuel prices, and the type of vehicles used. For instance, a report by the American School Bus Council highlights the cost-effectiveness and safety benefits of using school buses as the primary mode of transportation for students (ASBC, 2021).

Education Logistics

Education logistics is the process of managing and coordinating the various resources, activities, and stakeholders involved in delivering educational services. It encompasses the planning, organization, and execution of tasks related to student transportation, facility management, staff scheduling, and resource allocation. A study by Kim & Kim, 2017published in the International Journal of Educational Management emphasizes the importance of effective logistics management in ensuring the smooth operation of educational institutions.

Some key aspects of education logistics include:

Student Transportation: Ensuring that students reach their designated schools safely and on time. This involves managing transportation schedules, routes, and vehicle maintenance.

1. Facility Management: Efficiently utilizing and maintaining school buildings, classrooms, and other facilities to provide a conducive learning environment.
2. Staff Scheduling: Coordinating the schedules of teachers, administrators, and support staff to ensure adequate coverage during operational hours.
3. Resource Allocation: Efficiently distributing educational materials, equipment, and technology across different school sites and classrooms.

In conclusion, transportation costs and education logistics are critical components of the broader educational ecosystem. They impact the quality of education, the safety of students, and the overall efficiency of educational institutions. By understanding and addressing these factors, policymakers, educators, and stakeholders can work towards creating a more efficient and effective educational system.

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Efficiency Improvement Strategies and the Reduction of Transportation Costs in Education Implementing Alternative Learning Methods

By incorporating e-learning and blended learning models, educational institutions can significantly reduce transportation costs. E-learning allows students to access educational materials remotely, while blended learning combines traditional classroom learning with online resources (Ally, 2017).

Optimizing Routes and Scheduling:

Optimizing transportation routes and scheduling can lead to cost savings. By using route optimization software, schools can determine the most efficient routes for buses, reducing travel time and fuel consumption (Keshavarz-Ardekani et al., 2015).

Promoting Carpooling and Public Transportation:

Encouraging students and staff to carpool or use public transportation can help reduce the number of vehicles on the road, resulting in lower transportation costs. Schools can facilitate carpooling by providing carpool matching services or incentives for those who participate (Huang et al., 2019).

Utilizing Alternative Transportation Modes:

Promoting the use of alternative transportation modes like bicycles or walking can further reduce transportation costs. Schools can create bike-sharing programs or walking school buses to encourage these eco-friendly options (Wilson et al., 2017).

Regular Vehicle Maintenance:

Ensuring that school vehicles undergo regular maintenance can help improve their fuel efficiency and reduce the likelihood of costly breakdowns. This practice can lead to long-term savings in transportation costs (Brown et al., 2018).

Adopting Green Transportation Practices

Investing in electric or hybrid school buses can help reduce transportation costs in the long run due to lower fuel expenses. Additionally, these environmentally friendly vehicles contribute to a sustainable future (Brown et al., 2018).

Collaborating with Other Schools:

Schools can share transportation resources and costs by collaborating with neighboring institutions. This partnership can lead to more efficient use of vehicles and reduced transportation expenses (Huang et al., 2019).

In conclusion, implementing these efficiency improvement strategies and reducing transportation costs in education can lead to financial savings and a more sustainable future for schools.

Methodology

The researcher utilised a descriptive survey research design. This assists in providing information on efficiency improvement strategies for reducing transportation cost in education logistics. Therefore, the researcher created a presentation by stating the incident

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as it occurred without any manipulation of the factors. The target population of the study was secondary school teachers in Lagos State Education District V.
This includes 3514 instructors in the district. The district is comprised of both junior and senior secondary school teachers but only the senior secondary school teachers were the respondents.
District V comprises the Ajeromi/Ifelodun, Amuwo-Odofin, Badagry, and Ojo zones. The sample for this study was 120 teachers. Proportionate stratified and simple random sampling procedures were employed to arrive at the sample. Simple random sampling was utilised to select 30 teachers from each zones making 120 teachers that was selected.

Instrumentation

Three research instruments were used for the study, Efficiency Improvement Questionnaire (EIQ), Reducing Transportation Cost Questionnaire (RTCQ), and Education Logistics Questionnaire (ELQ). The scale comprises 5 items each which were designed to measure Efficiency Improvement Strategies for Reducing Transportation Costs in Education Logistics. It is a four-point Liked scale measurement ranging from 1-Strongly Disagree (SD), 2-Disagree (D), 3-Agree (A), and 4- Strongly Agree (SA).
The scoring of the instrument was made concerning the 4-point Likert-type rating scale of Strongly Agree (4 points), Agree (3 points), Disagree (2 points) and Strongly Disagree (1 point). The questionnaire has been subjected to proper validation with a reliability 0.72 coefficient using Pearson's product-moment correlation coefficient. The researcher personally visited the schools with the help of two trained research assistants to administer the questionnaire to teachers and this was made feasible by asking the approval of the principals. The respondents were appropriately advised on the importance of the study and were assured of the anonymity of their responses. Data collected were evaluated using Pearson's Product Moment Correlation Coefficient. Proportionate stratified and simple random sampling procedures were employed to arrive at the sample. 50% of each school in the zone was picked and simple random sampling was used to select 10 instructors from each selected school.

Data Analyses

Hypothesis

There is no significant relationship between the implementation of efficiency improvement strategies and the reduction of transportation costs in education logistics.
To test this hypothesis, the data collected were summarized and subjected to Pearson Product Moment Correlation (PPMC) analysis. The result of the Pearson Product Moment Correlation (PPMC) analysis is presented In Table 1

Table 1
Pearson Product Moment Correlation (PPMC) between the Implementation of Efficiency Improvement Strategies (IEIS) and the Reduction of Transportation Costs (RTC) in Education Logistics

Variable	N	Mean	Std. Deviation	R	p-value
IEIS	120	13.29	1.862	-.062	.499
RTC	120	1.55	.743		

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Table 1 reveals that there was a negative non-significant correlation between Implementation of Efficiency Improvement Strategies (IEIS) and the Reduction of Transportation Costs (RTC) in Education Logistics, r = -0.062; N = 120; p-value > 0.05.This implies that implementation of efficiency improvement strategies will reduce of transportation costs in education logistics; and vice versa. There was an extremely weak relationship between implementation of efficiency improvement strategies and the reduction of transportation costs in education logistics accounted for 0.4% in the relationship (r = -0.062).

Discussion of Findings

The outcomes of the research adopting a descriptive survey research design to investigate efficiency improvement ideas for lowering transportation costs in education logistics among senior secondary school teachers in Lagos State Education District V showed fascinating insights.

The study targeted a population of 3514 instructors in District V, focusing primarily on senior secondary school teachers. Through proportionate stratified and simple random selection processes, a sample of 300 teachers was selected from several zones within the district, including Ajeromi/Ifelodun, Amuwo-Odofin, Badagry, and Ojo. Each zone supplied 30 teachers, totaling 120 teachers.

Three study instruments were utilized: Efficiency Improvement Questionnaire (EIQ), Reducing Transportation Cost Questionnaire (RTCQ), and Education Logistics Questionnaire (ELQ). These measures, each consisting of 5 Likert-scale items, were created to measure stress management among instructors. The questionnaires underwent validation, reaching a reliability coefficient of 0.72 using Pearson's product-moment correlation coefficient.

Data collecting involves personal visits to schools, with the assistance of trained research assistants, to administer the questionnaires to teachers after gaining consent from principals. Participants were instructed on the relevance of the study and ensured of the anonymity of their responses.

The data were evaluated using Pearson's Product Moment Correlation Coefficient to test the hypothesis, which claimed that there is no significant association between the deployment of efficiency improvement measures and the reduction of transportation costs in education logistics.

The results demonstrated a negative, non-significant connection (r = -0.062) between the Implementation of Efficiency Improvement Strategies (IEIS) and the Reduction of Transportation Costs (RTC) in Education Logistics, with a p-value of > 0.05. This implies that the use of efficiency improvement measures neither significantly increases nor decreases transportation costs in education logistics among the sampled senior secondary school teachers.

Further study of the relationship found an exceedingly weak association, accounting for approximately 0.4% of the variance in the relationship. This shows that issues beyond efficiency improvement measures play a more substantial influence in affecting transportation costs in education logistics.

These findings motivate more study into the dynamics of transportation costs in education logistics, considering additional variables that may affect cost reduction measures. Future research should look into issues such as infrastructural development, legislative

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interventions, and technological improvements to acquire a full grasp of optimizing transportation costs in educational settings.

Conclusion

In conclusion, the study sought to Efficiency Improvement Strategies for Reducing Transportation Costs in Education Logistics in public secondary school in Lagos State Education District V. Utilizing a descriptive survey research approach and employing three research instruments, the findings provide insight on the dynamics of transportation costs and their relevance to efficiency improvement initiatives.

Despite the rigorous sample methodology and data collection methods, the analysis revealed a surprise outcome. Contrary to the initial prediction, there was no significant association between the deployment of efficiency improvement measures and the decrease of transportation costs in education logistics among the sampled teachers. The correlation analysis indicated a minimal link, suggesting that other factors beyond efficiency programmes play a more major role in affecting transportation costs.

These findings stress the complexity of transportation logistics within educational systems and show the necessity for a diverse approach to cost reduction initiatives. While efficiency improvements are obviously helpful, they may not singularly address the numerous difficulties connected with transportation expenses in education.

Furthermore, the study underlines the significance of continuing research and evaluation in meeting the shifting needs of education logistics. As transportation costs and logistical constraints continue to evolve, continual assessment and adaptation are important to maintain the sustainability and efficacy of cost reduction methods.

In conclusion, while the study did not generate the expected association between efficiency improvement measures and transportation cost reduction, it acts as a spur for additional exploration and innovation in education logistics. By taking a holistic view and employing multiple strategies, educational stakeholders can work towards more efficient and cost-effective transportation networks, thereby increasing the educational experience for all parties involved.

Recommendations

Based on the findings of the study regarding Efficiency Improvement Strategies for Reducing Transportation Costs in Education Logistics in public secondary school in Lagos State Education District V, several recommendations can be made to address the identified challenges and optimize cost reduction efforts:

Comprehensive Analysis of Transportation Costs: The government should conduct a complete review of transportation costs within education logistics to identify particular cost drivers and areas of inefficiency. This analysis should incorporate issues such as fuel expenditures, maintenance charges, route optimization, and vehicle utilization.

Integration of Technology: Educational Administrators should explore the integration of technology solutions, such as Global Positioning System (GPS) tracking systems and route optimization software, to optimise transportation operations and save costs. Technology can help in optimizing routes, improving vehicle maintenance scheduling, and enhancing overall efficiency in transportation logistics.

Collaboration with Stakeholders: The government through education administrators should foster collaboration and engagement with key stakeholders, including transportation providers, government agencies, and local communities, to explore novel

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cost-sharing methods and creative solutions. Engaging stakeholders in communication and collaboration can help uncover shared interests and potential for collective action in decreasing transportation costs.

Policy Interventions: Actors in the field of education should advocate for policy interventions at the municipal and state levels to reduce regulatory hurdles and create incentives for cost-efficient transportation methods. This may include measures such as tax incentives for fuel-efficient automobiles, subsidies for transportation services, and regulatory reforms to expedite administrative processes.

Continuous Evaluation and Adaptation: The government should establish a framework for continuous evaluation and adaptation of transportation strategies, periodically reviewing performance indicators, soliciting feedback from stakeholders, and adjusting strategies as needed to address emerging challenges and opportunities.

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