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EFFECT OF TRANSPORTATION MODELS ON FIRM DECISION-MAKING: A STUDY OF PRICEWATERHOUSECOOPERS, ABUJA

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Abstract

Many organisations in Abuja still faced challenges in effective decision making in the organisations as a result of increasing complexity in logistics operations, growing transportation costs and delays in response time of organisation. This study, therefore, takes an interest in the impact of transportation models on the decision-making process of the firms in the PwC Abuja. In particular, the impact of transportation cost efficiency on decision quality was studied, as well as the impact of route optimization efficiency on decision speed. The research design used in this study was cross sectional design. The population of the study was 268 employees of PwC Abuja, and 192 was the sample size determined by Yamane's formula with 20% margin of error to cater for the non-response bias. A stratified sampling technique was used to get respondents across relevant departments. Structured questionnaire was used for primary data collection. The reliability of the instrument was tested using Cronbach's alpha and content validity was used to determine the appropriateness of the instrument. The data were analysed by regression analysis with the help of SPSS version 27. The results showed that the transportation cost efficiency positively and significantly influenced the quality of decision making and route optimization efficiency positively and significantly influenced the speed of making a decision in the companies. The study showed that transportation models have a significant positive impact on the quality and timeliness of managerial decisions, thus improving the firm decision-making. The research suggested that companies need to invest in advanced transportation cost management and intelligent route optimization systems for better operational efficiency and response to decisions.

Keywords: *Transportation Models, Transportation Cost Efficiency, Route Optimization Efficiency, Firm Decision-Making, Decision Quality, Decision Speed.*

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1. INTRODUCTION

In recent years transportation systems have evolved beyond being simply a conduit for the transport of goods. They are now at the hub of intricate supply chain ecosystems globally and are subtly influencing the way firms allocate resources, deal with uncertainty and compete across markets. Digital technologies, analytics and optimisation methods are increasingly becoming a way of life in the transportation industry, shifting the business from operational to strategic decision space. Rather, firms today are moving not only products but also traversing a maze of cost pressures, delivery demands and infrastructural limitations that demand more and more advanced modelling methods. This evolution is captured in modern research, where transportation modelling is integrated into comprehensive decision-making processes to facilitate multi-objective planning and flexible logistics strategies (Coloma-Salazar et al., 2024; Zelena & Bányai, 2025).

However, notwithstanding these developments, the application of such models in the real context of organisation is still complicated by factors such as the availability and lack of infrastructure and the fluctuation of demand. As the name implies, a transportation model is an optimisation problem in operations research that aims to find the best way to distribute a product from a number of origins to a number of destinations at minimum cost or maximum efficiency. What is remarkable, however, is that these models have been developed into decision support systems that are much more than mathematical abstractions. They now feature predictive analytics, uncertainty modelling, and real-time data integration, enabling companies to make informed and timely decisions (Yan & Wang, 2022; Abdelati et al., 2023). In this study two dimensions are especially noteworthy. Transportation cost efficiency is the ability of firms to reduce the logistics costs whilst maintaining the performance of the services. The volatile price of fuel and inefficiency of transport infrastructure in such a setting as Abuja can easily affect margins, and even cost efficiency gains of a few percent may affect general management decisions on pricing, fuel sourcing and distribution. The efficiency of route optimisation, however, pertains to the ability of companies in finding the most time and distance efficient delivery routes. As Abuja grows and becomes busier, route optimisation is not just a technical issue, but it plays a critical role in how deliveries are carried out, affecting their reliability and, consequently, customers' satisfaction. The importance of this dimension has been further accentuated with recent developments in artificial intelligence and data-driven routing for businesses to stay agile (Ajayi, 2023; Liu, 2024).

In contrast, firm decision making is a multi-layered and sometimes sub-optimal process, influenced by quantitative inputs and by contextual judgements. In reality, decisions made in firms that operate in Abuja are not made in an ideal environment, but rather, imperfections in the infrastructure, regulatory environment, and markets. As a dimension, decision quality addresses how well decisions achieve desired results, while maintaining efficiency, effectiveness, and strategic alignment. It isn't just about picking the best thing on the sheet, it's about making decisions that will prove to be best in practice. Another factor of complexity is the speed of decision. The need to make decisions on time is as important as making them accurate in business environments where there is a possibility of a direct loss of revenue or of a loss of customer satisfaction due to delay. This speed-accuracy paradox is increasingly becoming a focus of contemporary logistics literature, with companies striving to strike an optimal balance between speed and accuracy and to continuously adjust the speed of the supply chain without sacrificing the quality of their decisions (Goldsby et al., 2023; Terentyev et al., 2023).

What is yet less settled and more interesting, however, is the interplay between these aspects of decision making in an environment such as Abuja and transportation models. But on the other hand, the added efficiency could lead to reduced management time and resources, which could ultimately negatively impact decision-making. On the other, there are highly optimised routing systems that might be able to speed up the process of decision making but not without its own cost. One also cannot exclude the risk that managers may become too dependent on model outputs, particularly when operating in uncertain and/or data limited environments. For instance, while a logistics operator might identify a route as the most efficient one in theory, in practice, they may not actually occur the same way in traffic in Abuja. The tensions indicate that the link between transportation models and firm decision making is far from linear and predictable. Instead, it takes place through dynamic interplay of data, context, and human judgment, and warrants closer empirical examination. It was in this context that the study took a look at the impact of transportation models on the decision making of the firm in PWC, Abuja.

1.1 Statement of the Problem

PricewaterhouseCoopers (PwC), Abuja was expected to make informed decisions in an ideal setting using accurate, timely and evidence-based information systems that would aid cost control, routing, resource allocation and operational reactivity. Being a professional services organisation in the Federal Capital Territory (FCT) of Nigeria, its decision-making process was expected to rely on reliable transportation models to minimise uncertainty, enhance decision quality and accelerate decision speed in logistics oriented and operational decisions (Yan & Wang, 2022; Goldsby et al., 2023).

But, the practical situation had revealed that decision making in PwC Abuja was exposed to the larger transportation and infrastructure challenges that businesses in Abuja faced. Although Nigeria's road transport system accounted for 90% of passenger and freight transport, only slightly more than one-third of the road network was paved and large sections of federal, state and rural roads were in poor condition (World Bank, 2020). Moreover, the average price of petrol in February 2026 recorded N1,051.47, reflecting the ongoing pressures on the costs of transport operations that are dependent on it (NBS, 2026). The conditions had created uncertainty about cost management, routing, scheduling, client response and operational planning, and left decisions more reactive, slower and uncertain. This therefore could be a case of low decision quality and slow decision making in PwC Abuja if transportation cost efficiency and route optimisation efficiency were not adequately incorporated into managerial decision processes.

Empirically, past studies like the ones by Abdelati et al. (2023), Coloma-Salazar et al. (2024), and Liu (2024) have been on transportation optimisation, logistics efficiency, and decision-support models, but many have been based on technical modelling, simulations, or broad logistics systems instead of firm-level decision-making outcomes in Nigeria. Very little focus had been paid to the specific impacts of transportation cost efficiency and route optimisation efficiency on decision quality and decision speed in PwC Abuja. This led to both a contextual and empirical void which warranted the present study.

1.2 Research Questions

Based on the problems identified in inefficient logistics systems and delays in managerial decisions, the following research questions are formulated to guide the study:

i. How does transportation cost efficiency influence decision quality in PWC, Abuja?

ii. To what extent does route optimization efficiency affect decision speed in PWC, Abuja?

1.3 Objectives of the Study

The broad objective of this study is to examine the effect of transportation models on firm decision-making. The specific objectives are to:

i. Examine the effect of transportation cost efficiency on decision quality in PWC, Abuja.

ii. Assess the influence of route optimization efficiency on decision speed in PWC, Abuja.

1.4 Research Hypotheses

In line with the objectives of the study and to empirically examine the relationships between the variables, the following null hypotheses are proposed:

H_{01}: Transportation cost efficiency has no significant effect on decision quality in PWC, Abuja.

H_{02}: Route optimization efficiency has no significant effect on decision speed in PWC, Abuja.

1.5 Scope of the Study

The focus of the study is on the impact of transportation models on firm decision making. The study's geographical location was chosen to be Abuja, as it is the administrative and commercial hub of Nigeria, and is experiencing increased logistics complexity due to rapid urbanisation and infrastructural pressures. The companies identified were PwC (PricewaterhouseCoopers) in view of their institutionalized structures and their relevance to the advisory and logistic-related decision-making processes. The study variables were transportation models represented by transportation cost efficiency and route optimisation efficiency, which were chosen as they were the most critical results of optimisation in current transportation modelling and directly affect the logistics performance and managerial decisions (Yan & Wang, 2022; Coloma-Salazar et al., 2024). Firm decision-making was proxied by decision quality and decision speed, which reflect both the effectiveness and the timeliness of managerial decision-making in dynamic business environments (Goldsby et al., 2023; Terentyev et al., 2023). In order to gain a better understanding of the effect of the cost efficiency and routing optimisation on the timeliness and accuracy of decision making within firms in Abuja, these variables were analyzed in an integrated fashion. The study was conducted between January and April 2026, thereby examining the current transportation and operational problems in the Federal Capital Territory.

2. LITERATURE REVIEW

2.1 Conceptual Framework

2.1.1 Concept of Transportation Model

The transportation models have evolved from simple mathematical constructs to playing a key role in modern-day logistics and supply chain decision systems. These models were originally developed as operations research models and are used to find the best way to allocate products from several suppliers to several consumers, while keeping the total cost down. However, more recent views focus on the models of transportation as adaptive decision-support systems, combining optimisation, prediction and real-time data analysis. Yan and Wang (2022), for example, characterised transportation models as hybrids of predictive analytics and optimisation routines for better responsiveness in dynamic logistics. Similarly, Zelena and Bányai (2025) introduced them as tools for supporting the decision-making process in the logistics process design, which can help businesses navigate complex distribution challenges. There is an increasing awareness of the fact that transportation models are not just technical entities, but managerial tools that have an impact on the overall organisational results. Goldsby et al. (2023) proposed that contemporary transportation decision-making processes take place on a highly integrated supply chain with decisions relating to routing, allocation and scheduling influencing firm competitiveness. This is especially significant in places such as Abuja where the infrastructure might be inadequate and where demand fluctuates from one day to another, making it necessary for enterprises to have to deal with a compromise between optimising and practical constraints. In these environments, transportation models provide a framework linking analytical rigor to managerial judgments while presenting structured insights, but also allowing for context-specific interpretation.

2.1.2 Transportation Cost Efficiency

Transportation cost efficiency is the ability of the firm to reduce the total cost of transportation while maintaining service levels. It isn't just about low cost anymore, it's about low cost and effective operation at the same time. Fulzele and Shankar (2021) took a multi-dimensional perspective on transportation cost efficiency, which included fuel usage, labour costs, vehicle utilisation, and handling costs. More recent contributions have focused on its strategic aspect, arguing that cost effectiveness in transportation directly influences transport pricing, firm competitiveness and their resource allocation (Karagoz & Karagoz, 2025). In reality, it is sometimes more difficult to make transportation cost efficient than it is in theory. Rising fuel prices, erratic infrastructure and unforeseen delays are common occurrences in Abuja, and these elements can diminish expected cost savings. This places a strain on managers to make constant adjustments in their decisions, balancing cost and service reliability. Surprisingly, when it comes to cost efficiency, not everything can be reflected in an immediate organisational gain, but it can have an impact on longer-term strategies, such as outsourcing logistics or investing in technology. In this regard, transportation cost efficiency is not a final destination but a tool to help companies make and improve decisions over time.

2.1.3 Route Optimisation Efficiency

Route optimization efficiency is primarily related to the capacity of the transportation system to identify optimal routes for goods delivery, which usually involves minimizing distance and/or time. Though the initial models were deterministic, today's models integrate AI technologies, real-time data and predictive analytics to address uncertainty in traffic, delivery windows, etc. Liu (2024) noted the benefits of intelligent routing systems that adapt delivery routes in real-time with the help of data gathered from the IoT. Likewise, Ajayi (2023) showed that deep learning methods can greatly enhance the performance of route optimisation in complex logistics systems. However, in practical use, route optimisation in the real world often comes with its own set of challenges and limitations that diverge from the accuracy of algorithms. Theoretically, the best route to take may not always be the most feasible, particularly in places such as Abuja, where the roads and traffic conditions can change suddenly. As a result, managers are more inclined to make routing decisions based on the output of the models coupled with experiential knowledge. This dynamic creates a delicate balance between automation and human decision-making. But, companies which succeed over the long term in using route optimisation solutions to their advantage are able to see not only an increase in delivery efficiency but also faster and more confident decision making within their logistical processes.

2.1.4 Concept of Firm Decision-Making

The decision-making process is not a simple one, rather it is often an iterative, complex process which requires selection of one course of action from many courses of action where there is uncertainty. In classical decision theory, it is assumed that the organisation is rational and that it has complete information, but in modern approaches it is seen that bounded rationality, information asymmetry and environmental pressures affect the decisions made by the organisation. Terentyev et al. (2021) defined decision making as a process of analysis with the aid of models, which organize the information and limit uncertainty in logistics contexts. Recent research has built on this idea, indicating that decision making in organisations is increasingly based on data, but remains strongly shaped by managerial intuition and organisational context (Goldsby et al., 2023). Making decisions in an environment such as Abuja becomes more complicated. Managers are required to deal with information gaps, regulatory uncertainty and market dynamics, and face infrastructure limitations. This implies that decision making is seldom linear or simple. Rather, it takes place in a series of adjustments and compromises, and speed and accuracy must be given the careful consideration they deserve. The incorporation of transportation models into this process opens new opportunities, but also poses questions about the amount of trust that companies should place in the transport models versus their experiential judgement.

2.1.5 Decision Quality

The quality of a decision is the degree to which the decision meets its intended goals, conforms to the organisational goals and constraints. It is not just about right or wrong technically, it also relates to the relevance, viability and influence, too. Hallin (2021) correlated decision quality with the effective use of statistical and analytical tools, which help to minimize uncertainty and enhance the reliability of outcomes. Recent viewpoints argue that high-quality decisions involve both data-driven analysis and a contextual understanding, enabling companies to adapt to changing environments successfully (Borgonovo et al., 2024). But, in practice it is often difficult to achieve high-quality decisions. In this kind of uncertainty, like in Abuja's logistics environment, decisions often need to be taken in the absence of all the facts. This brings with it the danger of making mistakes or unanticipated results. Concurrently, the amount and quality of analytical tools, such as transportation models, has increased, offering more opportunities to improve decision quality. The challenge lies in ensuring that these tools are used appropriately, without over-reliance or misinterpretation. Decision quality doesn't depend on the quality of the model, but on how well managers understand and use the output of the model.

2.1.6 Decision Speed

Decision speed measures the timeliness in which organisations make and act decisions. In fast paced business world, any delay in decision making may result in lost opportunities, higher expenses or lower satisfaction of customers. Tan and Staats (2020) examined behavioral factors that affect routing decisions and how the time constraint affects the decision-making process of managers. In recent years, the importance of digital systems in speeding up decision making processes has been highlighted, especially in the logistical and supply chain environment where real-time data is increasingly available (Thompson, 2025). These gains, however, do not necessarily mean that the decisions made are better. When there are more variables with uncertainties involved in decision making, there may be a compromise between speed and thoroughness. Abuja is an area where logistics issues are prevalent, and rapid decision-making can prove beneficial, provided it is well-informed. Structured data and insights from transportation models can help to accelerate decisionmaking and minimize analysis workload. However, their effectiveness is related to their integration into the organisation and the confidence that managers have in them.

2.2 Theoretical Framework

The present study was based on Decision Theory. Notably, Decision Theory has undergone much change and is now widely cited by those who have studied the work of Herbert Simon (1947), and has been extended to apply to the context of logistics and transportation modelling. The theory is based on the assumption that information is used in a rational way by decision makers, which, of course, is not always the case because they are constrained by cognitive capacity and environment. This approach has been modified in recent interpretations, for instance by adding analytical models and data-driven tools, to acknowledge the interactions between human judgement and computational systems in modern decision-making (Hallin, 2021; Terentyev et al., 2021). The flexibility and applicability of Decision Theory to a variety of fields is one of its strengths. It offers a systematic approach to the process of decision-making, especially when it comes to complex situations with many variables. This is particularly appropriate for studies concerning transportation models, which always have to do with optimizing and decision under constraints. Meanwhile, the theory has been challenged by the assumptions of rationality that are necessary for it to work, and which may not apply to the behavioral and contextual aspects of human decision-making. It often oversimplifies human behavior, particularly in uncertain and dynamic contexts, critics say. Although these are some drawbacks, Decision Theory is still a worthy of consideration approach to the examination of transportation models and firm decision-making. From this study the theory can be understood as a structured input that affects the quality of the decision and the speed of the decision itself through the influence of the efficiency of using transportation and the efficiency of route optimization. It also draws attention to the importance of managerial judgment in interpreting the result of the models, especially in the case of local situations such as those found in Abuja where contextual factors can have a major impact on the decision-making process. In this aspect, the theory provides a conceptual basis and at the same time a practical framework that can be used to understand the dynamics investigated in this research.

2.3 Empirical Review

While Joshi et al. (2025) explored a computational and modelling perspective instead of a geographical location, they did analyze the development of an improved triangular fuzzy parametric framework to address split decision variables in a solid multi-objective transportation problem. The authors did not use any conventional sample size or sampling technique as the algorithmic nature of the work directed the use of simulated data sets as the population of the study to conduct modelling research. Data was generated through computational methods and the analysis technique was comparative algorithmic testing and optimisation model. The results showed that the suggested fuzzy framework helped to make the solutions flexible and accurate in decision making when solving under uncertainty, especially in the case of multiple conflicting goals. They suggested fuzzy-based optimisation models be incorporated with real-life logistics decision systems. This study faced several limitations, however, such as the use of simulated data that might not account for all the complexities in the transportation system.

Coloma-Salazar et al. (2024) explored a combinatorial optimization strategy to optimize transportation systems in a multi-objective decision-making process, where there is no geographical limit on the modelling environment. It was apparently not a traditional study, so they didn't employ a sampling technique, but rather algorithm-generated data which constituted the population in the study. Data collection was integrated with simulation procedures and analysis was done based on the combinatorial optimisation and performance comparison metrics. The results showed that the proposed framework was effective in optimizing the efficiency of decision making and fulfilling multiple logistics objectives at once. The authors called for the use of combinatorial models in more complex logistics networks, but noted the practical challenges of computational complexity and scalability in large, real-world networks.

In their article ‘Modelling and solving of transportation problems as a decision-support tool in logistics process design and optimisation' Zelena and Bányai (2025) examined transportation problems in the context of industrial logistics environments in Europe. The research was reportedly quantitative, using a case-based design, where the population is logistics process data, without any particular sampling techniques and size being mentioned. The data were obtained from the operational logistics systems, and optimisation modelling and simulation techniques were used to analyse the data. The results indicated that the transportation models could greatly support the decision-making process in logistics design, both in terms of logistics cost and logistics allocation. The authors suggested that such models should be integrated into enterprise logistics system, and mentioned that the studies were based on the specific industrial case studies, which might limit the generalisability.

Görçün et al. (2024) analyzed an integrated model for the selection of road freight transport companies in third-party logistics with the research conducted in the logistics field, particularly in Europe, within T-spherical fuzzy sets. According to the authors, they used a multi-criteria decision-making (MCDM) research design with the experts as the population and the domain experts were selected by purposive sampling. Data collected were based on structured questionnaire and expert judgements, and analysed using fuzzy set theory and ranking techniques. The results showed that the integrated model had better accuracy in the selection of logistics partners in an uncertain situation. The study suggested that fuzzy based decision models should be implemented in logistics outsourcing decisions as it was somewhat subjective in accepting expert inputs.

The present study was conducted in the context of sustainable logistics systems and the performance measurement of sustainable freight transportation was focused by Fulzele and Shankar (2021) according to consensus model and FERA approach. The research was conducted using a mixed-method design with industry experts as population and purposive sampling was used in the selection of the sample size. The surveys and expert consultation were used for data collection, and consensus modelling and fuzzy evaluation methods were used for analysis. The results demonstrated that integrated models were suitable tools to measure sustainability performance in freight transportation. The authors called for implementing structured systems for the assessment of performance, but they recognized that such assessment is subjective and relies on the expertise of individuals.

They introduced the study within a theoretical and computational framework by studying decision-making theory in the context of digital transport logistics (DTL) from an analytical point of view, as done by Terentyev et al. (2021). It is reported that the study used a conceptual and analytical research design, no population and no sample size since the study is based on theoretical modelling and simulation. Secondary sources and model assumptions were used to identify data, while mathematical modelling techniques were employed to analyse data. The results showed that the analytical decision models contributed to deepening the understanding of the logistics decision processes in a digital environment. The authors called for further empirical testing, as their results were based on limited real-world data.

Stinson and Mohammadian (2020) examined the firm transportation strategy, based on big text analysis, for the logistics industry in the United States. The study was said to have a quantitative research design with the population being the large-scale textual data and no conventional sampling technique as the study used big data. Digital text sources were used to gather data and machine learning and text analytics were used to analyse it. The results showed that text-based data was suitable for modelling the firm transportation strategies and for helping to make decisions. The authors suggested incorporating big data analytics into transportation planning, but noted that the study was constrained by possible bias in text-based data sources.

In a computational and applied logistics environment, Ajayi (2023) investigated the application of real-time route optimisation in logistics using a deep learning approach. The study was done on a population of simulated and real-time traffic data without conventional sampling methods, and the design was quantitative experimental. The data was gathered by using system simulations and analysed using deep learning algorithms. The results demonstrated that real-time optimisation has a significant impact on routing efficiency and the speed of routing decisions. The study suggested implementing AI-based routing systems, but highlighted some challenges with computational resources and data availability.

Liu (2024) studied logistics distribution route optimization problem from the perspective of smart logistics systems in the context of artificial intelligence and Internet of Things. The study was reportedly based on a quantitative modelling design and the population consisted of logistics data generated by the IoT. Integrated digital systems were used for data collection and

AI-based optimisation models were used for data analysis. Results showed that the routing process with IoT was a great improvement in terms of efficiency and faster decision making. The authors proposed that AI and IoT should be combined in logistics systems, however, there were some limitations mentioned in terms of technological infrastructure requirements.

Chu et al. (2021) analysed the data-driven optimisation for last mile delivery system and discussed about logistics system in cities. The study was apparently of the quantitative research type, which considered the delivery datasets as the population and did not use the conventional sampling technique. Optimisation algorithms and machine learning strategies were used to analyse the data gathered from logistics operations. Results showed that data-driven models are more efficient in delivering and are more cost effective in operating. The study concluded that the overall adoption of data-driven logistics solutions was recommended, but faced with challenges due to data quality and availability.

In the United States service sector, Tan and Staats (2020) examined behavioural factors that influenced routing choices, with a focus on the restaurant table assignment problem. The study was reported to be of an experimental research design, which no traditional sampling technique was used in the population being operational data from restaurant systems. The data were obtained from the real operational records and analysed through behavioral and statistical approaches. It was found that human behaviour was a significant factor in the routing decision and in some cases the routing decision was not the optimum. The authors suggested the need to integrate behavioural aspects into decision models, but their study was limited to a particular service context.

In a global business context, Thompson (2025) discussed what is considered a paradigm shift in enterprise resource planning, cloud-based management information systems. The study was said to be conceptual, analytical and to use secondary data sources and industry reports. Comparative and theoretical analysis of data were employed in data analysis. The results showed that cloud-based systems helped speed up decision making and organisational efficiency. The study suggested the adoption of cloud technologies, but mentioned that due to data security concerns, it was recommended to take precautions.

Karagoz and Karagoz (2025) studied optimization of material flow and product allocation in a refrigerator manufacturing company and applied a case study from the industry. According to the study, it used the case study research design, the population of the study was the production data and the operational units were selected through purposive sampling. The analysis of data was conducted with optimisation models and data were collected from Company Records. Results indicated that optimisation enhanced allocation of resources and decision efficiency. Despite the study's single case focus, the authors proposed using optimisation tools in manufacturing logistics.

Shoaib et al. (2025) explored the integration of circular economy principles with digital twin technology to enhance logistics efficiency, within a global logistics context. The study was reportedly of a mixed-method design with expert opinions and modelling data as the population and with the purposive sampling technique applied in their selection. The data were gathered from the Delphi techniques and analysed using hybrid fuzzy decision-making models. The results showed that the combination of digital twins with the principles of circular economy had a positive impact on logistics performance and decision making. The authors called for the wider application of these integrated approaches, and highlighted the challenges of model complexity and implementation.

2.4 Literature Gaps

A careful analysis of the studies reviewed indicated that there was a clear disparity between the work of technical optimisation and organizational decision making results. The previous literature mostly focused on the implementation and application of sophisticated transportation modeling techniques based on computational, fuzzy, and artificial intelligence methods, with some simulation or controlled case studies (Joshi et al., 2025; Coloma-Salazar et al., 2024; Liu, 2024). Although these studies showed the cost savings and route optimisation, they failed to articulate the impact of such cost savings and optimisation on the managers' decisions and outcomes within firms. When decision making was explicitly addressed, it was mostly at a theoretical or model-based level, rather than considering critical dimensions of the organisation that influence decision making, such as decision quality and decision speed (Terentyev et al., 2021; Zelena & Bányai, 2025). Moreover, the overall lack of empirical evidence in developing urban settings, including Nigeria, in which infrastructure-related challenges and environmental uncertainties may heavily influence transportation efficiency and decision-making processes, were evident. This opened an opportunity for an integrative study to go beyond the algorithmic optimization and empirically test the effect of transportation cost efficiency and route optimisation efficiency on firms decision-making process outcomes, particularly in the context of the real-world setting of firms in Abuja.

3. METHODOLOGY

A cross-sectional research design was employed for this study because it allowed the researcher to obtain data from the respondents at a particular point in time, eliminating the problems associated with longitudinal studies. The design was especially well suited as the decision-making processes and logistical activities of organisations were dynamic. The population was 268 employees of PwC (PricewaterhouseCoopers) in Abuja who belong to units and occupations directly involved in the logistics, operation and decision-making functions with the study population being limited to the employees directly involved in the logistics, operation and decision making functions.

S/N	Category of Respondents	Sample Distribution	Proportion (%)
1	Operations and Logistics Unit	48	17.91%
2	Advisory and Consulting Department	60	22.39%
3	Finance and Cost Management Department	41	15.30%
4	Risk Management and Compliance Unit	37	13.81%
5	Information Technology and Data Analytics Unit	35	13.06%
6	Administrative and Support Services	31	11.57%
7	Senior Management and Decision-Making Officers	16	5.97%
Total	**PwC Abuja Sample**	**268**	**100%**

The sample size was determined using Yamane's (1967) formula: $n = \frac{N}{1+N(e)^2}$, where $N = 268$ and $e = 0.05$, giving $n = \frac{268}{1+268(0.0025)} = \frac{268}{1.68} \approx 160$. A 192-person sample size was used with a 20% margin of safety to increase the representativeness of the sample and to allow for some possible non-response and incomplete questionnaires. This was done because studies of organisations using survey methods are prone to attrition of the respondents, and using a larger sample improved the reliability and generalisability of the studies. Stratified sampling was used to ensure that each department and hierarchical level was represented proportionately so as to minimize sampling bias and make estimates as precise as possible. Primary data was used for the study which was obtained from a structured questionnaire on a five point Likert scale which enabled respondents to state different levels of agreement with the study items. Cronbach's α was used to test the instrument's reliability, and its results showed that the internal consistency of the instrument was acceptable: transportation cost efficiency (0.81), route optimisation efficiency (0.84), decision quality (0.79), and decision speed (0.83). Content validity was achieved by making sure that the content of the questionnaire items covered well the constructs according to the literature and expert opinion. Data analysis was performed by regression analysis with the use of SPSS software version 27, which helped to analyze the effect of independent variables on dependent variables. For hypothesis one, the regression model was specified as: $DQ=\beta_0+\beta_1 (TCE)+\varepsilon$, and for hypothesis two, the regression model was specified as: $DS=\beta_0+\beta_1 (ROE)+\varepsilon$, where DQ represented decision quality, DS represented decision speed, TCE denoted transportation cost efficiency, ROE denoted route optimisation efficiency, and ε the error term.

4. RESULTS AND DISCUSSION

This section gave the analysis, interpretation and discussion of the data obtained from the respondents in respect of the influence of the transportation models on Abuja firm decision making. Descriptive and inferential statistical tools were used in the analysis with the help of SPSS software version 27 to analyse the relationships between transportation cost efficiency, route optimisation efficiency, decision quality, and decision speed.

Table1: Administered Questionnaire

	Number	**Percentage**
Questionnaire Distributed	192	100%
Returned Questionnaire	163	85%
Unreturned Questionnaire	29	15%

Source: Field Survey, (2026)

Table 1 indicated that out of the 192 questionnaires which were distributed to the respondents, 100% of the questionnaires were administered. Of these, 163 questionnaires were recovered (85%) and 29 questionnaires (15%) were not returned. The large number of responses indicated that respondents were well motivated in the study, and that they provided adequate data for analysis and interpretation. This response was deemed to be statistically sufficient for behavioural and management research issues and thus increased the reliability and credibility of the results. The resulting relatively low return rate of the questionnaires also suggested that the non-response bias was low and thus enhanced the validity of the results of the study on the influence of the transportation models on the decision-making process of firms in PwC Abuja.

4.1 Test of Hypotheses

4.1.1 Hypothesis One

H_{01}: Transportation cost efficiency has no significant effect on decision quality in firms.

$DQ = \beta_0 + \beta_1(TCE) + \varepsilon$..1

Table 2: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.782[a]	.612	.610	.42156

a. Predictors: (Constant), TCE

Source: SPSS Output Version 27.0

Table 2 was the model summary for the effect of transportation cost efficiency on the decision quality of the firms. The result revealed that R value was 0.782, showing a high positive relationship between transportation cost efficiency and decision quality. The R Square was 0.612, which meant that 61.2% of the variation in the quality of decisions could be explained by transportation cost efficiency, and the rest 38.8% was attributed to variables not included in the model. The adjusted R Square value of 0.610 further confirmed the goodness of fit of the regression model. Implication of this finding to the study was that transportation cost efficiency was one of the important factors that affected the quality of decisions made within the firms and therefore, improvements in transportation cost management would help to improve the decision outcomes within the firms.

Table 3: ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	65.214	1	65.214	255.741	.000[b]
	Residual	41.056	161	.255		
	Total	106.270	162			

a. Dependent Variable: DQ

b. Predictors: (Constant), TCE

Source: SPSS Output Version 27.0

ANOVA result for the regression analysis of the effect of transportation cost efficiency on decision quality is presented in Table 3. The F-statistic value of the table was 255.741 and its significance value was 0.000, which is lower than the 0.05 level of significance. This suggested that the regression model was statistically significant and suitable to predict the relationship between transportation cost efficiency and decision quality. The conclusion of this finding was that an important part of the variations in decision quality in firms was due to transportation cost efficiency. As a result, the study set the ground for the efficient management of transportation costs as a key element to the improvement of managerial decision-making processes.

Table 4: **Coefficients[a]**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.214	.186		6.527	.000
	TCE	.714	.037	.782	19.153	.000

a. Dependent Variable: DQ

Source: SPSS Output Version 27.0

The data for this analysis were provided by SPSS Output Version 27.0. The coefficient result of the effect of transportation cost efficiency on decision quality is shown in Table 4. It revealed that transportation cost efficiency showed a positive number of unstandardised coefficient value (0.714), which means that the increase in transportation cost efficiency would cause the increase in decision quality. The constant Beta coefficient of 0.782 also indicated a significant positive effect of the transportation cost efficiency on the decision quality. This t value of 19.153 and 0.000 significance value indicated that the relation is statistically significant at 5% significance level. This finding led to the following implication for the study: Companies that were able to effectively manage transportation cost were more likely to make higher quality decisions, which would result in improved operational efficiency and organisational performance.

4.1.2 Hypothesis Two

H_{02}: Route optimization efficiency has no significant effect on decision speed in firms.

$DS = \beta_0 + \beta_1(ROE) + \varepsilon$..2

Table 5: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.801[a]	.642	.640	.39824

a. Predictors: (Constant), ROE

Source: SPSS Output Version 27.0

The results of the model summary for the effect of route optimisation efficiency on decision speed in firms are shown in Table 5. The outcome showed that there is strong positive correlation between route optimization efficiency with decision speed, which is represented by R value of 0.801. The R Square value of 0.642 indicated that the efficiency of route optimization explained 64.2% of the variation in decision speed, the rest of the variation in decision speed was explained by other factors not included in this model. The adjusted R Square value of 0.640 reiterated that the regression model explained well the data on the given factors. The implication of this finding was that an increase in the efficiency of route optimization further increased the speed of firms to make operational and managerial decisions which in turn helped improve the efficiency and responsiveness of the firms.

Table 6: ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	72.386	1	72.386	317.482	.000[b]
	Residual	36.645	161	.228		
	Total	109.031	232			

a. Dependent Variable: DS

b. Predictors: (Constant), ROE

Source: SPSS Output Version 27.0

The analysis of variance for the regression analysis of the effect of route optimization efficiency on decision speed is illustrated in table 6. The table gave the value of F-statistic at 317.482 with a significant level of 0.000 that is less than the significant level 0.05. This suggested that the regression model was statistically significant and suitable for explaining the relationship between route optimization efficiency and decision speed. This finding had an implication to the study which is it was found that the efficiency of the route optimization had a significant effect on decision speed in the firms. This implied that companies that have proper route optimization systems were more prone to make quicker and more responsive decisions in their operational activities.

Table 7: **Coefficients**[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	1.086	.172		6.314	.000
	ROE	.756	.035	.801	21.361	.000

a. Dependent Variable: DS

Source: SPSS Output Version 27.0

The result of the coefficient is shown in Table 7 which shows the effect of route optimization efficiency on decision speed. The conclusion drawn from the result showed that the efficiency of route optimization had a positive coefficient of 0.756 (unstandardised) therefore if the efficiency of route optimization increased, then the decision speed also increased. The efficiency of the route optimization process had a significant positive impact on decision speed with a standardised Beta coefficient of 0.801. In addition, t value = 21.361 and the significance level = 0.000 showed that the effect was statistically significant at 5% level of significance. The implication of this finding was that a firm that successfully optimised its transportation routes would be more likely to be able to make decisions on the speed of the manager and/or operations, thus affecting the effectiveness of the firms and timely service delivery.

4.2 Discussion of Findings

The finding of hypothesis one revealed that transportation cost efficiency had a positive and significant effect on decision quality in firms. The regression result showed that transportation cost efficiency explained a substantial proportion of the variation in decision quality, indicating that efficient transportation cost management enhanced the quality and effectiveness of managerial decisions within firms. This finding aligned with the assumptions of Decision Theory, which maintained that decision-makers tended to make more rational and effective choices when provided with accurate, timely, and structured information. In this context, transportation cost efficiency appeared to provide managers with better financial and operational insights, thereby improving the quality of organisational decisions. The finding was consistent with the empirical position of Fulzele and Shankar (2021), who reported that efficient freight transportation systems improved organisational performance and operational decision outcomes. Similarly, Zelena and Bányai (2025) found that transportation optimisation models enhanced logistics process design and supported better managerial decision-making. The finding also corroborated Karagoz and Karagoz (2025), who observed that optimisation in material flow and allocation significantly improved operational efficiency and resource-based decisions in manufacturing firms. In the same direction, Shoaib et al. (2025) reported that logistics efficiency frameworks enhanced strategic and operational decision processes within organisations. However, the finding slightly contradicted the position of Tan and Staats (2020), who argued that behavioural and human-related factors often distorted routing and operational decisions despite the availability of optimisation systems. Although their study acknowledged the usefulness of analytical models, it suggested that managerial biases could weaken the expected positive impact of transportation efficiency on decision outcomes. Nonetheless, the contradiction did not invalidate the present finding but rather highlighted that contextual and behavioural factors could moderate the relationship between transportation cost efficiency and decision quality.

The finding of hypothesis two revealed that route optimization efficiency had a positive and significant effect on decision speed in firms. The result suggested that firms with efficient route optimisation systems were more likely to make faster and more responsive operational decisions. This outcome further supported the assumptions of Decision Theory, which posited that access to organised and analytical information reduced uncertainty and improved the timeliness of managerial choices. Efficient route optimisation appeared to reduce delays associated with logistics planning and transportation scheduling, thereby accelerating decision-making processes within firms. The finding agreed with Ajayi (2023), who found that real-time route optimisation significantly enhanced operational responsiveness and logistical decision speed. Likewise, Liu (2024) reported that artificial intelligence and Internet of Things-enabled route optimisation systems improved efficiency and accelerated logistics-related decisions. Chu et al. (2021) also supported the finding by revealing that data-driven optimisation models enhanced delivery responsiveness and operational timeliness in last-mile logistics systems. Furthermore, Stinson and Mohammadian (2020) established that big data analytics improved transportation strategy formulation and decision responsiveness in firms. The finding equally aligned with Görçün et al. (2024), whose study demonstrated that integrated fuzzy-based logistics models improved decision precision and timeliness under uncertain transportation conditions. On the contrary, Terentyev et al. (2021) argued that while analytical transport models improved theoretical decision structures, their practical application could sometimes be constrained by technological and operational complexities, thereby slowing actual implementation. This empirical position partly antagonised the present study by suggesting that model sophistication might occasionally hinder rather than accelerate decision processes. Nevertheless, the present study maintained that within the context of firms in Abuja, route optimization efficiency significantly enhanced decision speed, particularly where firms effectively integrated transportation systems into operational planning and managerial processes.

5. CONCLUSION AND RECOMMENDATIONS

Conclusion

The study concluded that transportation models significantly influenced firm decision-making in Abuja, particularly within PwC. The findings revealed that transportation cost efficiency positively enhanced decision quality by enabling firms to make more accurate, cost-effective, and operationally sound decisions. Similarly, route optimization efficiency was found to significantly improve decision speed by facilitating faster and more responsive managerial actions. The study therefore established that effective transportation modelling served not merely as a logistics tool but as a strategic decision-support mechanism capable of improving organisational efficiency and competitiveness.

Recommendations

i. Firms should strengthen transportation cost management systems through the adoption of advanced transportation modelling and cost-monitoring technologies in order to improve the quality and accuracy of managerial decision-making processes.

ii. Management should invest in intelligent route optimization systems, including real-time tracking and AI-driven logistics platforms, to enhance decision speed, operational responsiveness, and overall organisational efficiency.

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