Process Innovation Strategies on The Performance Of Transport Companies In Nairobi, Kenya

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Abstract

The performance of public transport companies in Nairobi faces multifaceted challenges that significantly hinder efficiency, reliability, and customer satisfaction. Chronic traffic congestion is estimated to cost Nairobi up to KES 100 billion annually in lost productivity due to time delays and fuel wastage. Consequently, there is a pressing need to explore how innovation strategies can be leveraged to address these challenges and enhance the performance of public transport companies. This study aimed to establish the effect of process innovation strategies on the performance of transport companies in Nairobi, Kenya. Roger's theory on diffusion of innovation anchored the study. This study was limited to Metro, Orokise and River of God Transport companies based on a report by the National Transport Services Authority indicating that these companies had adopted innovative customer service practices and the respondents were employees of the three transport companies. This study adopted descriptive research design. Seven hundred and sixty-four (764) employees working for Metro, Orokise and River of God Transport companies were targeted. Sample size was 263 respondents drawn from the employees (managers and supervisors, drivers and conductors) from the three transport companies. Data was gathered through questionnaires. The collected data was analyzed using the Statistical Package for Social Sciences. Both descriptive statistics (frequencies, percentages, means and standard deviations) and inferential statistics (correlation and linear regression) were performed. Descriptive results showed that the respondents agreed to a great extent that process innovation strategies affected the performance of transport companies in Nairobi, Kenya. Regression findings revealed that there was a positive and significant relationship between process innovation strategies and performance. Furthermore, process innovation strategies were strongly and positively correlated with performance.

Key words: *Process innovation strategies, performance, transport companies*

1.0 Introduction

The nature of business settings globally today is characterized by rapid technological advancements and increasing globalization (Kotler & Armstrong, 2021). Organizations are operating in a challenging environment where digital transformation is crucial in redefining industries and business strategies. Further, technology has enabled businesses in streamlining operations, enhancing efficiency, and reaching global markets more effectively (Porter &

Heppelmann, 2014). Globalization has expanded opportunities for trade and investment, allowing businesses to access diverse talent pools, resources, and markets worldwide. However, it also presents challenges such as geopolitical uncertainties and regulatory complexities that require organizations to adapt agile strategies and risk management frameworks (Rugman & Verbeke, 2020). Moreover, consumer behavior has shifted towards sustainability, ethical practices, and personalized experiences, prompting businesses to innovate and differentiate themselves through corporate social responsibility initiatives and customer-centric strategies (Kotler & Armstrong, 2021).

Strategic innovation is the deliberate and purposeful application of new thinking to existing problems, leading to new solutions and the creation of sustainable competitiveness (Chesbrough, 2020). According to their perspective, strategic innovation is a systematic method to leveraging creativity to achieve enduring market differentiation and profitability. It involves the implementation of innovative ideas, processes, products, or organizational structures that significantly alter the organization's routines, practices, or outputs (Johnson, 2018). This definition underscores the disruptive potential of innovation, highlighting its capacity to reshape organizational structures and practices. Strategic innovation is the leap beyond the dominant paradigm, creating new business models, and fundamentally altering industry dynamics (Girotra & Netessine, 2021).

Process innovation focuses on rethinking how tasks are executed within an organization to achieve better outcomes, streamline operations, and respond to market demands (Klein & Sorra, 2022). In the transport industry involve the systematic redesign or improvement of operational processes, workflows, and procedures for enhancement of efficiency, reducing costs, and improving the overall performance. They include implementing advanced scheduling algorithms to optimize route planning and resource allocation, adopting real-time tracking and monitoring systems to improve fleet management and logistics, and integrating automated maintenance systems to reduce downtime and enhance vehicle reliability (Hipp & Grupp, 2020). These strategies are essential for transport companies to remain competitive by increasing operational efficiency, meeting customer expectations for reliability and timeliness, and adapting to technological advancements in the industry (Lee & Trimi, 2018).

Kenyan public transport companies contribute to sustainable urban development by providing affordable, accessible, and environmentally friendly transportation options. They support economic activities, reduce traffic congestion, and promote social inclusion by connecting communities (World Bank, 2019). Public transport companies in Kenya vary in size, scope, and ownership structure. They typically operate under different legal frameworks and are regulated by local authorities such as the National Transport and Safety Authority (NTSA) and county governments (Gitonga & Ngugi, 2020).

Kowo, Akinbola, and Akinrinola (2021) found that process innovation significantly influenced performance in Nigerian telecommunication firms using survey data analyzed with SPSS. Similarly, Momanyi, Armurle, and Nyaboga (2020) reported a strong positive correlation between process innovation strategies and performance in tea firms in Kericho and Kisii, Kenya, using descriptive and inferential statistics. Wambui, Kahuthia, and Gakenia (2018) also confirmed a positive effect of process innovation on firm performance at Telkom Kenya Ltd through a census

of 40 employees. While these studies used different contexts and sampling methods, all affirmed the positive impact of process innovation on performance.

Despite their critical role in Kenya's transport ecosystem, public transport companies continue to face multifaceted challenges that hinder efficiency and service delivery. Inadequate road networks and limited infrastructure for bus terminals and railway stations constrain operational performance and reduce passenger convenience (World Bank, 2019). Additionally, complex regulatory frameworks, inconsistent enforcement of transport laws, and challenges posed by the informal sector complicate efforts toward regulatory compliance (Gitonga & Ngugi, 2020). Safety risks including frequent road accidents, poor vehicle maintenance, and security threats undermine both passenger safety and operational continuity (Odhiambo & Madara, 2017). Moreover, economic pressures, such as fluctuating fuel prices and fare regulation, further threaten the financial sustainability of public transport operations.

While these challenges have been widely documented, innovation strategies such as smart mobility solutions, digital fare systems, real-time tracking, and predictive maintenance remain underexplored as potential responses. There is limited empirical research evaluating how public transport operators in Kenya, particularly in Nairobi, are adopting or could adopt such innovations to overcome systemic inefficiencies. Nairobi is a logical focus for this research as it represents the nation's leading and most complex urban transport hub, where both formal and informal operators intersect, and where innovation pilots are most likely to scale. The urgency of this study lies in the need to respond to rapid urbanization, rising demand for safe and efficient transit, and growing environmental concerns.

2.0 Theoretical Review

This study was anchored on Rogers' Theory on Diffusion of Innovations. Everett Rogers is the primary proponent of the theory. Rogers synthesized decades of research to develop a comprehensive framework explaining the diffusion process and the factors that influence the adoption of innovations (Rogers, 2003). Ryan and Gross extended Rogers' work by emphasizing the function of communication channels and social networks in the facilitation the spread of innovations, which is crucial for understanding how innovations permeate through different segments of society (Ryan & Gross, 1943).

According to the theory, innovation refers to an idea, practice, or product that is viewed as emerging or distinct by those who may adopt it. The method by which information about the innovation is spread has a critical function in establishing the way it is adopted quickly. Efficient communication channels help lessen uncertainty surrounding the innovation and support its acceptance (Rogers, 2003). The process of adoption typically follows a recognizable trend, commonly represented as an S-shaped curve. Innovations tend to be adopted slowly at first, accelerate as more people adopt them, and then plateau as saturation levels are reached. The social system refers to the network of relationships among individuals and groups that influence their attitudes, behaviors, and adoption decisions. Opinion leaders and influencers within these networks play a critical role in shaping adoption patterns (Rogers, 2003).

Critics argue that Rogers' theory presents a somewhat linear and deterministic view of innovation diffusion, which may oversimplify the complicated and robust nature of adoption processes in diverse contexts (Rogers, 2003). Some scholars suggest that Rogers' theory may not always

accurately predict adoption outcomes, particularly in cases where innovations face unexpected barriers or where adoption patterns deviate from the typical S-shaped curve (Rogers, 2003).

By applying Rogers' theory, transportation firms can analyze the adoption patterns of upcoming technologies like electric vehicles, autonomous driving systems, and sustainable transportation solutions. This understanding helps firms anticipate market demand and plan their innovation strategies accordingly (Rogers, 2003). Rogers' theory highlights the importance of identifying early adopters and opinion leaders within the transportation industry. These individuals and organizations have a critical function in influencing others' adoption decisions and can serve as strategic partners or collaborators in promoting new innovations (Ryan & Gross, 1943). Rogers' theory highlights the significance of putting into considerations local contexts and social systems when introducing new transportation innovations. Cultural preferences, regulatory frameworks, and infrastructure capabilities vary across regions, influencing the adoption rates and success of innovations (Rogers, 2003).

3.0 Research Methodology

This study adopted descriptive research design which is used to describe characteristics of a population, without manipulating variables. This study targeted 764 employees (managers, supervisors, drivers and conductors) of Metro, Orokise and River of God Transport companies based on a report by the National Transport and Safety Authority in 2021 indicating that these companies have differentiated themselves in their customer service approaches. Sample size was 263 respondents obtained by Yamane's formula. This study used questionnaires and interview schedule to collect data. Data analysis was done with the aid of Statistical Package for Social Sciences (SPSS) software version 25. Data was cleaned first then coding was done and entered in the software ready for analysis. Both descriptive and inferential statistics were carried out. Descriptive analysis involved generation of summary statistics (frequencies and percentages, means and standard deviations) while inferential statistics involved correlation and regression analysis.

The regression model was as shown

$$Y = \beta o + \beta 1 X 1 + \varepsilon o$$

Where:

Y $\quad = \quad$ Performance

$\beta_0 \quad = \quad$ Constant

$\beta_1 \quad = \quad$ Coefficients of Independent variable

$X_1 \quad = \quad$ Process innovation strategies

$\varepsilon_o \quad = \quad$ Error term

4.0 Results

4.1 Descriptive statistics

This section presents descriptive statistics that summarize the key characteristics of the collected data, providing insights into variable distributions and trends. Summaries were done using means and standard deviations.

4.1.1 Process Innovation Strategies

The mean and standard deviation for the statements of process innovation strategies are as presented in Table 1. The findings revealed that route planning and scheduling ensures efficient utilization of resources while minimizing travel time for passengers (Mean=3.94, std. dev=0.94). Findings further showed that the company integrates passenger demand forecasting with route optimization numbers (Mean=3.95, std. dev=0.98). The findings, furthermore, showed that the company has fleet management systems that enhance vehicle maintenance scheduling and driver performance monitoring (Mean=3.71, std. dev=1.02) and that the company has implemented fleet management technologies to improve operational performance (Mean=3.86, std. dev=0.93). Additionally, results revealed that the company has adopted innovative technologies to enhance fuel efficiency and reduce emissions in their fleets (Mean=3.85, std. dev=0.96). The results also showed that the company has plans to transition towards hybrid-electric vehicles (Mean=3.88, std. dev=0.87). The results showed that the respondents agreed to a great extent that process innovation strategies affected the performance of transport companies in Nairobi since the overall mean score was 3.86 and a 0.95 standard deviation.

Table 1: Process Innovation Strategies

Process innovation strategies statements	N	Min	Max	Mean	SD
Route planning and scheduling ensures efficient utilization of resources while minimizing travel time for passengers	208	1.00	5.00	3.94	0.94
The company integrates passenger demand forecasting with route optimization numbers	208	1.00	5.00	3.95	0.98
The company has fleet management systems that enhance vehicle maintenance scheduling and driver performance monitoring	208	1.00	5.00	3.71	1.02
The company has implemented fleet management technologies to improve operational performance	208	1.00	5.00	3.86	0.93
The company has adopted innovative technologies to enhance fuel efficiency and reduce emissions in their fleets	208	1.00	5.00	3.85	0.96
The company has plans to transition towards hybrid-electric vehicles	208	1.00	5.00	3.88	0.87
Overall mean score				3.86	0.95

From a supervisor's point of view, process innovations have made daily operations more structured and efficient. The use of GPS tracking and fleet management systems allows us to monitor vehicle movement and ensure schedules are followed. Digital communication tools make it easier to relay instructions to drivers and conductors quickly. Additionally, maintenance routines are now tracked digitally, helping us prevent breakdowns and minimize delays. These changes have improved our

service consistency and made it easier to manage our teams effectively. As a driver, the new process innovations have really helped improve how work is done. Route tracking and digital scheduling ensure that we know exactly where we need to be and when, reducing confusion and delays. Real-time updates help avoid traffic or reroute quickly if there are issues. We also spend less time waiting for instructions or dealing with fare disputes.

Integrating demand forecasting with route optimization is increasingly recognized as a best practice in public transport planning. It involves using historical ridership data, traffic patterns, and real-time analytics to design or adjust routes to meet actual commuter needs more efficiently. This helps in minimizing operational costs, reducing fuel consumption, and improving customer satisfaction by ensuring buses or matatus are available where and when demand is highest (Sun et al., 2021).

Shen et al. (2023) note that data-driven forecasting systems combined with dynamic routing models significantly enhance operational efficiency and reduce wait times in cities like Singapore and Seoul. Similarly, Li and Zhang (2022) found that AI-powered demand forecasting tools contributed to more efficient fleet allocation in China's public transport sector, leading to both cost savings and improved commuter experiences. In the Kenyan context, where transport demand can fluctuate based on time of day, season, and urban migration trends, this integration is vital for sustainability. The company's use of such advanced planning reflects a shift towards intelligent transport systems (ITS), which are essential for modernizing services and ensuring passenger-centered route planning.

4.1.2 Performance

The study sought to confirm from the respondents, on a scale of 1-5, the degree to which statements relating to performance were applicable in their transport company (Table 2). The findings revealed that the number of customer complaints has significantly decreased over the past year (Mean=4.04, std. dev=0.99). Findings further revealed that the company has expanded its fleet with more vehicles in the last 12 months (Mean=4.13, std. dev=0.93). The findings showed that there has been a noticeable increase in the number of passengers using our services (Mean=4.07, std. dev=0.88) and that customer satisfaction has improved due to enhanced service quality (Mean=4.20, std. dev=0.94). Additionally, results revealed that the company profits have increased as a result of improved operational efficiency (Mean=3.86, std. dev=0.92). The results also showed that the performance improvements have made the company more competitive in the transport sector (Mean=4,15, std. dev=0.84).

Table 2: Performance

Performance statements	N	Min	Max	Mean	SD
The number of customer complaints has significantly decreased over the past year	208	1.00	5.00	4.04	0.99
The company has expanded its fleet with more vehicles in the last 12 months	208	1.00	5.00	4.13	0.93

There has been a noticeable increase in the number of passengers using our services	208	1.00	5.00	4.07	0.88
Customer satisfaction has improved due to enhanced service quality	208	1.00	5.00	4.20	0.94
Company profits have increased as a result of improved operational efficiency	208	1.00	5.00	3.86	0.92
The **performance improvements have made the company more competitive in the transport sector**	208	1.00	5.00	4.15	0.84
Overall mean score				4.08	0.92

From supervisors' perspective, the company has seen noticeable improvement in performance since adopting innovation strategies. Improved scheduling and route optimization have reduced delays and helped us serve more passengers reliably. The training and restructuring under organizational innovation have made our teams more responsive and professional. Also, the introduction of digital tools for monitoring vehicle operations has allowed us to detect issues early and minimize downtime. All these changes have boosted efficiency, reduced complaints, and enhanced customer satisfaction. Managers denoted that the innovation strategies have made the companies more competitive, customer-focused, and operationally efficient, contributing to sustained growth and a stronger brand reputation.

Customer satisfaction has improved due to enhanced service quality reflects a strong overall consensus that improvements in service quality have positively influenced customer satisfaction in the Kenyan transport sector. Improved service quality in public transportation is often linked to factors such as reliability, safety, cleanliness, timeliness, courteous staff, and ease of payment. According to Parasuraman et al.'s SERVQUAL model, service quality dimensions such as tangibility, responsiveness, and assurance are key predictors of satisfaction (Alonso-González et al., 2021). In Kenya's context, efforts like introducing cashless fare systems, cleaner vehicles, and better-trained personnel likely contributed to these improvements.

Stipdonk and Harms (2022) found that service quality enhancements—such as route punctuality and vehicle cleanliness—increased commuter satisfaction in Dutch transit systems. Similarly, Ali et al. (2023) concluded that improvements in driver behavior, communication, and vehicle maintenance significantly boost satisfaction in South Asian transport settings. In Kenya's dynamic transport sector, especially among matatu operators and urban buses, enhancing service quality plays a crucial function role in retaining customers and gaining competitiveness. The findings support the opinion that a customer-centric service approach improves satisfaction and long-term performance in the sector.

5.2 Inferential Statistics

5.2.1 Correlation Analysis

The Pearson correlation was employed to find the relationship between the independent variables and employee engagement as shown in Table 3

Table 3: Correlation Results

		Performance
Performance	Pearson Correlation	1
	Sig. (2-tailed)	
	N	208
Process innovation	Pearson Correlation	.611[**]
	Sig. (2-tailed)	.000
	N	208

The results in Table 3 shows that statistically significant correlations were found between process innovation (r = 0.611, p = 0.000), and performance. Process innovations enable companies to operate more efficiently while reducing costs and delays. Yildiz and Yildiz (2020) demonstrated similar results in Turkey, where digitalized fleet management systems improved fuel efficiency and reduced breakdowns, thereby improving customer satisfaction and bottom-line performance.

5.2.2 Regression analysis

The regression analysis assisted in demonstrating the size of effect employee e-self-service systems have on employee engagement as shown in Table 4.

Table 4: Regression Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	.710	.248		2.858	.005
Process innovation	.332	.060	.347	5.511	.000

a.   Dependent Variable: Performance

Process innovation connoted a positive and statistically significant relationship with performance (β = 0.347, p = 0.000). This suggests that a one-unit increase in process innovation is likely to result in a 0.347-unit increase in performance. The results indicate that improvements in service delivery processes, logistics, and internal operations have the greatest impact on performance. Gonzalez and Llopis (2022) emphasize that transport companies that digitize and streamline their processes not only improve efficiency but also reduce costs and operational delays. In Latin

America, for example, transport firms that implemented GPS-enabled fleet tracking and route optimization technologies reported notable increases in fuel efficiency and customer satisfaction.

The following is the regression model that resulted:

$Y = \beta_o + 0.347X_1$

Where:

Y   =   Performance

X_1 =   Process innovation

6.0 Conclusion

By examining the impact of process innovation on performance, this study found a strong positive relationship, particularly where advanced technologies like fleet management systems, GPS tracking, and automated scheduling were implemented. These tools significantly improved operational efficiency by reducing costs, optimizing workflows, and increasing service reliability. However, the strength of this effect was also influenced by pre-existing organizational readiness and technological infrastructure: Transport companies with more mature digital capabilities saw greater performance gains. This suggests that while process innovation drives performance improvements, its effectiveness depends on the broader operational context in which it is applied.

7.0 Recommendations

Future efforts by transport companies should prioritize a deeper understanding of how automation and digitization impact various operational areas, including route planning, fare collection, maintenance scheduling, and real-time tracking. While this study highlights the benefits of adopting intelligent transport systems, further research is needed to explore how different innovation strategies such as the use of predictive analytics versus real-time monitoring affect outcomes like service reliability and customer satisfaction. Additionally, observational studies could offer valuable insights into how the integration of passenger data analytics supports more responsive and data-driven decision-making across diverse transit environments.

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