



Evaluation of Impact on Public Transportation Headwinds: The Case of eThekwini Municipality Department of Transport

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ABSTRACT

The challenges and constraints confronting public transportation efficiency within the regulatory local government stewardship in the municipality's spheres continue to have an inventory of misdemeanours such as mismanagement, dilapidating built environment in infrastructure, subdued digitalisation integration and transformation, contestation from privately owned transport entities, and poor control over transport operations. The public transport operations and its associated assets or infrastructure provide accessibility and act as wheels of economic growth and prosperity. These deliver a critical component of the envisaged good quality of life and standard of living from both the business perspectives and citizenry livelihoods state of affairs. The study investigated the public transport ecosystem and risks with associated resources. A structured questionnaire was used to collect data from pertinent stakeholders' respondents to predict and explain insights and trends from both primary and secondary stakeholders within the public transport fraternity in the city. The positivist philosophical approach of the quantitative methodology, with its deductive paradigmatic stance, is selected in the study. The main findings indicate the lack of comprehensive consultation and buy-in within the broader stakeholder involvement. The findings further signified a gap in risk mitigation and resource optimisation and the significance of public service accessibility as a priority for policy-makers and practitioners. Findings indicate that the Transport Division realised the need to inculcate pragmatic execution in investing resources and capabilities from a problem-solving and decision-making perspective. This could yield sustained public service deliverables in desirable and sustainable dimensions within the complex public transportation sector.

INTRODUCTION

The nature of public transportation facilities within most emerging markets and developing economies requires significant attention from authorities and decision-makers, given the over-reliance of commuters who utilise these essential services for daily and essential mobility and livelihoods. While these modes of transportation, such as buses, rails, taxis, e-hailing, ships, aeroplanes, etc, are under the curatorship and custodianship of the public entities and independent service providers such as entrepreneurs, they carry on their shoulders the make or break of the mobility economic spine. The significance of innovative

business models makes an essential contribution to the entity's strategic compass as it navigates the enterprise's fortunes through diverse marketing trends and patterns while inventing novelty-oriented customer service solutions and deliverables (Heinonen & Strandvik, 2021). Transportation refers to those significant and pivotal services supporting human beings and the cargo movement, especially within the economic hub of eThekwini, which boasts the biggest harbour and port within the sub-Saharan hemisphere. This maritime-oriented city, as the second largest contributor to the economy of the Republic of South Africa, has a daunting task of ensuring that efficacious public transit

systems, such as resilient infrastructure, investment in transportation resources, planning routes efficiency, proper and timely maintenance of modes of transport, overall management of collection of fares, assertive reliability and safety, effecting responding to disruptions is a top priority. While the City has experienced major headwinds such as the recent COVID-19 pandemic, July 2021 social unrest and upheaval, and the devastating April 2022 floods, its infrastructure has been adversely exposed. As such, the decisive sense of action is a major focal point for those entrusted with keeping the logistic wheels of motion on track. According to Statistics South Africa, the current population of the inhabitants within the City is approximately four (4) million, and most of these citizens still rely on effective and reliable public transportation systems.

Mundie (2020) and Wachira (2021) assert that the volatility that presents headwinds and challenges due to exogenous factors could stagnate and decelerate the economic and inclusive gains within the transport and logistics sector, including supply chains, which could have a devastating impact on economic prosperity. Wu et al. (2017) stated that transportation is an integral part of the public stakeholders and has drawn immense empirical connotation from the research perspective. Jirsák & Kršnáková (2015) emphasised the rationale for the geographic displacement of public transportation infrastructure and their proximity to other strategic investments and the continual improvement for the benefit of the broader economy. Public Transport challenges stretch far beyond just commuting ordinary citizens, as it should also cater to the vulnerable members of society, such as those with disabilities, children, school-goers, elderly communities, and tourists (Saif, Zefreh, & Torok, 2019). The broader stakeholders, such as independent transporters, e.g., taxis, had to display resilience due to the current high inflation and high cost of capital, with the increase in the prices of fuel likewise, which has extended more pressure on commuters and high the risk of managing the productive assets for transportation logistics (Hejaz, 2021). The risk element and profitability within the public transportation sector and the expected recovery and performance level of the entrepreneurs who complement the public-managed entities have put a dent in the sustainability and let alone the

affordability of masses of commuters who are generally on the lower spectrum of the Bottom of the Pyramid (Somabutr, 2021). Govender (2016) asserted that public transport from the governance policy realm comprises a variety of complementary or semi-linked modes, including minibus taxis, buses, and rail (eThekwini Municipality, 2023).

The only mode of public transportation that still has a regulatory deficit and is independently operated is the mini taxis, which also do not benefit from government subsidies or concerted support from the State. According to the National Household Data statistics, 68% of South African commuters depend on Taxis. Bus transportation services cater to approximately 21% of commuters, while those who travel by public rail make up around 10%. Public transport systems and networks, in terms of optimal accessibility and convenience, are a pivotal and fundamental part of economic systems where the systematic and integrated whole yields far better outcomes than the unplanned and disintegrated application of its parts. According to Zimmerman & Ke Fang (2025), in the application of institutional certainty within public transportation, the role of multi-modal scope plays a critical role, which is complemented by the municipal-wide context that is supported and anchored by systematic investment in infrastructure and resources and the well-planned operations and maintenance which also accommodate the role of subsidies and other funds injection for the benefits of the commuters.

Public transportation, like any management science-oriented business service within the broader value chain ecosystem, has some measure of both monetary and non-monetary risk. Business continuity management frameworks also contribute to the employment of risk management. The Integrated Development Plan (IDP), 2020-2025, proposed ways for organisations such as eThekwini municipality's public transport department to gravitate towards becoming a resilient institution, such as averting volatility and possessing adaptive strategies around systems, processes, procedures, policies, and information technology (IT). Torabi, Giahi & Sahebjamnia (2016) reiterated the significance of implementing key business imperatives, prioritising the control measure, and adopting corrective intervention when confronted with contingency anomalies, a view later

corroborated by Hassel & Cedregen (2021) within the context of public sector volatility. The execution and delivery of risk management imperatives within the public transport fraternity greatly influence the municipality and positively impact operational efficiency in accomplishing the desired objectives and outcomes (Shad & Lai, 2019). Enterprise Resource Management (ERM) could act as a catalyst and a propeller in galvanising the institutional, systematic pathway in de-risking the headwinds that could be experienced within the prospective delivery of a social good, such as the public transport commodity to the citizens of the city (Sax & Andersen, 2019). For the prosperity of almost every enterprise, risk management techniques such as ERM, within the globalisation context for all intents and purposes, play a critical role in organisational sustainability (Annamalah et al., 2018). Entities within the modern era, fuelled by innovation and technology, could implement risk mitigation product designs that could be appropriately adapted and choose the preferred location for an efficacious public commuter route, with an agile and nimble outcome (Prajapati et. al, 2019).

Transportation and the utilisation of innovative checks and balances strategies could facilitate the mitigation of risks and threats that might transpire within the logistics and commuting value chain, thereby diminishing damages, while transportation monitoring and evaluation exercises ascertain seamless transportation deliverables (Reeves, 2019). The public transportation value chain has an avalanche of elements integrated to achieve the set objectives of commuting the citizens from their place of domicile to their intended destination. There is an avalanche of tailwinds and aggregated systematic gains that can be co-created in the process through the integration of ERM within the public transportation ecosystem, for instance, as the mitigation of non-monetary behaviour constraints such as mismanagement, corruption, graft, maleficence, supply chain process irregularities, fruitless or wasteful expenditure, especially taking into cognisance the fundamental role of the cost of capital expenditure involved (Berry-Stölzle & Xu (2018). A comprehensive and customised execution or delivery of risk management and control within the public transportation value chain in conjunction with the synchronisation of institutional operations

yields effective and sustainable outcomes and broader stakeholder satisfaction, especially the citizens and the commuters who depend on these services for their survival and economic participation within their respective livelihood needs through this seamless integrated management system (Muzaimi, Chew & Hamid, 2017).

Therefore, proper and effective strategic leadership and management of internal control or environmental processes within the public transportation department are synergized and collaborated to ascertain that all significant and paramount pieces of the puzzle are well coordinated, thus facilitating a conducive environment for the accomplishment of objectives and are execution seamlessly (Muzaimi et al., 2017). Risk-averse propensity within the organization contributes to the positive risk culture while diminishing and eradicating the hindrances that catapult the institution, such as public transportation, into legitimate service from the customer's vantage point. At the same time, the City as an entity pursues its community's mandatory strategic task mandate (Thomya & Saenchaiyathon, 2015). When leaders and management from the agency premise of the organisation assume some measure of responsibility and accountability for the systematic reduction and amelioration of risk management, headwinds, procedures, systems and processes are then operated or implemented in a sustainable, customer-centric manner, and the brand reputation of the entity and the public transportation department is safely guaranteed (Thomya & Saenchaiyathon, 2015).

The process of the decision-makers in their capacity to effectively manage in an efficacious and results-driven manner, what they need to take cognisance of in ensuring that the process flow is adhered to for the institutional, stakeholder, and broader customer/citizens benefits. Aven (2016) depicts that coalescing evidence and data signifies the encapsulation and incorporation of elements or components that could provide pertinent information and facts on the ground and exercise the evaluation mechanism on the risk that empowers decision-makers and authorities, which also includes management and leadership to make systematic and logical decisions (Aven, 2016). Yoe (2016) accentuated that leadership management within an organisation has an enviable task and

mandate to have a heightened knowledge and prowess about evaluating and assessing risks and the capacity to take corrective action even if it warrants hard decisions for the organisational strategic well-being.

The Transport Accessibility Theory (TAT) advocates the systematic and logical encapsulation of a multidisciplinary resolution of those variables that will take cognisance of the accentuation on accessibility within the confines and scenarios of mobility or transportation, given the diverse nature of the population and citizens from a social context perspective. The rationale behind most public transportation also embraces the economic multiplier effect that policymakers attempt to equalize with the socially inclined realities, such as affordability and equality. It is, therefore, incumbent upon the decision-makers to have elasticity and sensitivity to the diverse reality, specifically over equitable and fair accessibility, as opposed to the monetized endeavour of the public transportation system to cater to those at the bottom of the economic chain and social capital. Service quality deliverables, which are consistent and reliable for the commuter within the public space, the perceived accessibility, a fair share of inclusion with accessibility, and the overall role of transportation risks in terms of commuter or stakeholder perceptions is a cornerstone for policymakers and decision-makers in the prioritization of customer service excellence (Friman, Lättman, & Olsson, 2020).

This view had been earlier advocated by Lucas, van Wee & Maat (2016), who alluded to the prioritisation of the social needs of society not only on the cost-based analysis dimension but also to assimilate diverse analysis criteria on behalf of the logical and feasible urban or public-oriented movement of the citizens. The collaboration of the economic activation and the socio-cultural characteristics was a focal point of attraction that was lobbied by policymakers in Russia, which proved to be a winning formula in balancing the transport infrastructure and its appropriateness in augmenting the societal accessibility and mobility aspirations (Skorobogatova & Kuzmina-Merlino*, 2017). The tangible and economic contribution to a policy-driven public transport system through the interface with integration makes a significant stride in matching up with innovation demands and

evolution (Polyzos & Tsiotas, 2020). Similar sentiments were also corroborated within the realm of competitiveness and productivity, which assures the normative performance from the operational perspective is accomplished (Polyzos, 2019). In a study done within the Ghana City of Accra pertaining to transport accessibility, the study illuminated the crucial role of public transportation and the logistics sector for a sustainable future use in mind (Acheampong et. al, 2022).

The rationale and logic behind the resource-based view theory is the optimisation of its competitive edge Teoli, Sanvictores, & An (2019), which originated from the entities that were geared toward profit-maximisation within the stiff face of competition to be sustainable and survive. Similarly, within the context of public sector entities, this could be construed as surplus or deficit regarding the bottom line of financial results and associated with the financial position of an entity. The main material resources that one finds in public institutions, such as the public transport service, range from institutional monetary and non-monetary resources, physical or asset-oriented resources, as well as human capital, which are endogenous in nature and within the institutional boundaries of an enterprise. Williams Jr et. al (2018) articulated the importance of a holistic and comprehensive innovation-oriented strategic approach in the administration and management of business functions such as capital, cash, or credit; the reality of public transport sustainability within its strategic objectives of providing a social value heavily depends on the human capital resource which should also include the trends and patterns within the framework of the global innovative context (Khilji & Schuler, 2017). The existential challenges within the context of the transition to cleaner energy require the policy-makers in institutions such as eThekwini City to repurpose their vision and strategies towards the future that accommodate such a climate change paradigm shift, considering the high capital-intensive nature of public transportation (Backman, Verbeke & Schulz, 2017). Efficient, good corporate governance, with its associated accountability and adherence to fiduciary obligations on the part of the decision-makers, plays a critical role within the context of the emerging market, where many times, impunity takes centre stage (Levy & Prakash, 2017).

METHODS

This quantitative study is predicated on the positivist philosophy of deductive theory testing. The chosen sampling technique, purposive sampling, assists in extrapolating the participants' experiences, competence, and insights. At the same time, the researchers assert that it is also mainly utilised in qualitative research (Michener & Sokal, 2017). All the participants were enlightened about the study's objectives, and ethical clearance approval was shared in collaboration with informed consent, safeguarding the participants' anonymity, confidentiality, and pseudonymity. The research instrument selected was a questionnaire segmented into demographical profiles and the actual research section (Taherdoost, 2016).

The research design offers the archetype of a blueprint and a synthesis of the framework utilised for gathering, quantifying, and analysing data (Crawford & Kelder, 2023). This study pursued a quantitative methodology that incorporates the explanatory, descriptive, and predictive empirical coalescing of data in a mathematical model, statistical, and computational application to provide inferences about the phenomenon under investigation (Balaban, Zhang, & Eilouti, 2021; North & Giddens, 2022). This study utilised the probability stratified random geographic sampling corresponding with plausible research applications, as scholars like Nguyen, Pham & Nguyen (2022) noted. This sampling corroborates with familiar credible data collection techniques and practices for hypothetico-deductive theory testing geared at public transport survey designs, as highlighted by (Rodriguez, Correia, Kelling, de Carvalho &

Teixeira, 2022) in recent methodological reviews. The study objectives focused on the following variables:

1. To examine the impact of resource risk mitigation on the public transport operations of the eThekwini municipality.
2. To investigate key impact factors impeding the transport operations at eThekwini Municipality
3. To assess the equitable accessibility solutions for the transport operations of eThekwini Municipality.

RESULTS AND DISCUSSION

Data Presentation

From a targeted sampling of 384 participants in the research completing the online municipal survey within the location of the study, 300 dully completed questionnaires were solicited, representing a strategic participation plausible enough for generalization and interpretation.

Table 1. Response Rate

Aggregate Sample	384
Responding Sample	300
Response Rate	78%

Reliability Analysis

Reliability analysis was undertaken using Cronbach's alpha (α) metric on the composite scales created by combining survey variables as projected. As affirmed in Table 1 above, alpha coefficients proved higher than the minimum 0.7 threshold value normatively concurred by researchers such as Rodriguez et al. (2022) to show suitable internal consistency in the reliability interpretation.

Table 2. Scale Reliability Analysis

Scale	Cronbach's Alpha	Items
Public Transportation Attitudes	0.82	6
Risk Mitigation Awareness	0.79	5
Social Resources Responsibility	0.83	4
Safety Protocol Difficulties	0.76	3
Institutional Preparedness	0.80	5

Table 3. Sample Demographic Profile

Demographic	Category	Percentage
Gender	Male	52%
	Female	48%
Age	$\geq 18 \leq$ years	11%
	$\geq 25 \leq 34$ years	29%
	$\geq 35 \leq 44$ years	23%
	$\geq 45 \leq 60$ years	31%
	60 + years	6%
Ethnicity	Black African	68%
	White	12%
	Indian/Asian	11%
	Coloured	9%
Education	Secondary education	34%
	Certificate/diploma	23%
	Undergraduate degree	26%
	Postgraduate degree	17%
Employment	Unemployed	18%
	Self-employed	22%
	Private sector	43%
	Public sector	12%
	Student	5%

Objective One: The impact of resource risk mitigation on the public transport operations of eThekwini Municipality

Descriptive statistical results characterized sample perspectives on how public transit services within their communities were impacted across

dimensions like ridership, financial performance, maintenance, safety, affordability, and equitable accessibility. Table 4 outlines respondents' perceptions of pandemic impacts on key public transportation parameters, rated on a scale of 5 (strongly agree) to 1 (strongly disagree).

Table 4. Perceived Public Transportation Impacts of Resource Risk Mitigation

Impact Statement	Mean	Standard Deviation
Public transportation ridership declined in my area	4.11	0.89
Many commuters shifted from trains/buses to private cars	3.88	1.04
Public transportation lost substantial revenues from lower ridership	4.23	0.77
Customer safety and customer satisfaction are hurting revenues	4.01	0.83
Policy-makers resources financial support for public transit operations	3.76	1.09
Public transportation is adversely affected financially	3.42	1.21
Train maintenance declined due to lower revenues	3.18	1.11
Equitable hikes and service cuts made public transportation more expensive	3.61	0.94
Public transportation accessibility customer service satisfaction	3.29	1.07

The findings in Table 4 reveal that participants strongly agreed that public transportation ridership significantly declined, with a mean score of 4.11 out of 5. The need for contingency government support with financial subsidies is essential to avert collapses, with a mean of 3.76, confirming risks, Mundie (2021), hence the lack of fiscal aid and

catastrophic bankruptcies emanate due to demand shocks. Responses also acknowledged the associated risk impact on resources from customers' or transport users' perspectives, with a mean of 3.84, corroborated by Saidi (2020) in the context of public transportation headwinds. Inferential statistical tests investigated whether significant

differences occurred in these impact perceptions across varied respondents' subgroups. A one-way ANOVA on age distribution determined significant variance existed for insights on ridership was reduced $F (4, 295) = 6.48$, $p = 0.002$, and transportation revenue deficits $F (4, 295) = 3.84$, $p = 0.018$. Gen Z groups revealed stronger agreement that operational volumes and incomes lurched, requiring the authority's attention. No significant

ethnicity impacts insights differences surfaced. ANOVA testing indicated significant differences for employment scenarios on perceived customer service quality reduction $F (4, 295) = 4.11$, $p = 0.003$ and maintenance decline $F (4, 295) = 3.22$, $p = 0.013$. Unemployed and student respondents agreed more strongly with train cleaning and repairs workers than with salaried workers.

Objective Two: The key impact factors impeding the transport operations during at eThekwini Municipality

Table 5. Moderator Factor Descriptive Indexes

Scale	Mean	Standard Deviation
Risk Mitigation Awareness	3.92	0.83
Customer Loyalty Precautions Responsibility	3.76	0.79
Safety Protocol Difficulties	3.21	0.88
Institutional Accountability	2.97	0.92

The mean indices were measured to profile sample views on response awareness, precaution responsibility, transport habits adjustment difficulty, and public transit operator preparedness, as indicated in Table 5. The conceptual model encapsulated risk awareness and resource mobilisation astuteness as a moderator, given the significance of cost-benefit analysis, showing actual objective knowledge mattered less than perceived understanding in shaping turbulent and crisis mode reduction behaviours as an adaptation to evolving threats and procedural adherence amid uncertainty (Chen & Li, 2021). The accountability perceptions were encapsulated, given that previous research on social responsibility models indicated that

obligations predicted consistent behaviours such as eco-actions without mandates, inculcating similar behaviours for transportation precaution compliance (Roy & Schwartz, 2019). Results indicate moderately receptive expectations and standards among the sample for invigorating customers and residents to sustain transportation system adherence. Preparedness assessments were grounded in turbulence-oriented principles that evaluate organizational resilience and recovery capabilities or agility, which research links to volatility coping effectiveness (Patel & Davis, 2020). Consequences indicate that perceived constraints and limitations jeopardise local velocity response coordination.

The equitable accessibility solutions for the transport operations of eThekwini Municipality

Table 6. Equitable Accessibility Resilience Solutions

Focus Area	Mentions
Improve infrastructure accessibility for the customers	198
Mitigation of safety risks on route settings	162
Punctual arrival and departure times improve customer satisfaction	154
Formulate contingency plans for mobility shocks reduction	132
Provide participation of train, cars/buses to mitigate crowding	129
Subsidize fares assistance for transit commensurate with affordability	117
Provision of flexible/remote work to reduce commuting headwinds	99
Reward active transit such as bicycles to reduce overcrowding	87
Deploy real-time transportation digital and online tracking apps to control, monitor, and evaluate operations	74

Strategic and contingency interventions ranging from providing financial and non-monetary resources for necessary public transportation

customer fares, investing in resources to foster customer satisfaction, promoting private use of other active transportation modes such as privately

owned vehicles, and executing real-time monitoring and evaluation applications have also galvanized fundamental recognition as pragmatic or logical solutions to tackle the socio-economic, professional efficiency, congestion, and oversight issues decimating public trust on public transportation reliability.

CONCLUSION

The echoes from wide and far within the broader public stakeholder community of practice that focus on the customers' expectations prioritise the reactivation of trust through the execution in an inclusive manner of explicit safety measures, the devising of plans and programs to provide pliability operationally and associate customers expectation, satisfaction and loyalty, and the augmenting of resources while reducing systemic risks to ensure equal accessibility. Considered systematic and logical within the study objectives and wider scholarship, synthesized evidence signifying public transportation complexities within eThekweni municipality proved fundamental yet moderated by Real-time psychological and operational challenges. Calibrating capacities and leveraging equilibrium to mitigate headwinds within the triple context of inherent risks, scarcity of resources, and legitimate public transportation accessibility, as well as pragmatic and transformation-oriented management acumen and strategic leadership acumen, are pivotal. Far-reaching implications signify the need to integrate behavioural and operational dynamics in expansive and transformational idiosyncrasies in which public transportation network complexities and turbulences are synthesized systemically and plausibly.

As demonstrated by the scholastic contribution and empiricism, psychological variables illuminate why seemingly cogent and coherent decision-making and problem-solving are at the front and centre of the end-users in the public transportation space. Institutional certainty astuteness illuminates where capabilities require effective coordination from a stakeholder-wide calibration and repurposing, thus mitigating sometimes avoidable disruptions and inequities. Inculcating these rational and credible dimensions highlighted a more transformative management, leadership, and strategically oriented approach to reducing the decline of public transportation mobility and

improving dynamics fundamental to the efficacious delivery of this significant social and essential transportation service.

The study illuminated that public transportation as a socially oriented value warrants prioritization from the policy-making level, institutional level, and execution level, which requires support, investment, the channelling of resources, and sensitivity to the economic realities of the broader population, especially those at the bottom of the social chain. There is an emphasis on the paradigm shift of the centralisation of decision-making and problem-solving, which should include the broader stakeholders, including the customers who patronise the public transport services. The main limitation of the study is that there is a lack of transparency in the allocation of resources and budgets from the decision-makers, such as the management and the practitioners on the ground, to be able to quantify the scale of the challenges within the income statement and the balance sheet perspective.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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