

Effects of Automobiles' Maintenance Management on Passengers' Services Delivery in Tanzania: Case of Selected Automobile Fleets in Ilala Municipality

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Abstract: This study examined the effects of automobile maintenance management on the quality of passenger service delivery in Ilala Municipality, Dar es Salaam, Tanzania. It explicitly examined three types of public transport services: commuter services, intercity bus services, and tour services. The study was steered by the Resource-Based Theory, Institutional Theory, and Human Capital Theory, which together provided insights into how the resources, organizational practices, and employees competencies affect service delivery. A cross-sectional survey design was adopted, and data were gathered through structured questionnaires managed to 100 defendants, chosen using both simple random and purposive sampling techniques. The composed data were analyzed using SPSS version 30. Correlation and multiple linear regression analyses were used to evaluate relationships and effects amid the study variables. The results revealed that automobile maintenance management plays an important role in ensuring safety, efficiency, and customers' satisfaction in passenger transport services. Thus, the well-managed vehicle maintenance proved to reduce service interruptions, minimize mechanical failures, enhance operational reliability, and improve the overall insight of service quality among passengers. The study concludes by stressing the importance of maintenance management in the sustainable delivery of commuter, intercity, and tour transport services in Tanzania.

Key words: Automobile, Maintenance Management, Passengers Service, Fleet, Municipality

I. Introduction

Vashisth, et al. (2018) indicated that, sustainable transportation requires relevant stakeholders to take full responsibility to the societal consequences linked to the sector. This should also include all expenses which should be paid by the forthcoming generations. Therefore, all relevant policies should be sustainable economically for mobility requirements, environmental protection and assets durability.

Poliak, et al. (2017) declared transportation being a helpful to mobility, especially in urban areas of Europe. Similarly, Chengula and Kombe (2017) pointed that, DART was introduced in Dar es Salaam city, to improve traffic flows and road safety. In addition, passengers' services vehicles should be well maintained, to avoid breakdowns, since they contribute to road traffic congestions. This study will introduce a model that integrates maintenance approaches to avert related problems.

Luke and Heyns (2020) declared existence of transport challenges facing urban areas including those of South Africa. It was further indicated that, they affect greatly mobility, leading to adverse effects on economic and social conditions. Most of relevant problems are caused by poor maintenance of assets, leading to repetitive breakdowns. Therefore, relevant authorities need to impose effective maintenance management strategies to ensure that, services provided are sustainable.

Furthermore, Malandri, et al. (2018) pointed that, rapidly populace growth raises a demand for more passengers' vehicles. Again, maintenance management is the best option for keeping up vehicles conditions to operate durably. Otherwise, this is another contributor to road traffic congestion and other bad environmental effects. In addition, Cats and Jenelius (2018) asserted, unforeseen interruptions such as excessive travelling time to the deemed destinations and losses associated with delays are unavoidable.

Sovacool, et al. (2022) indicated breakdowns being another cause of traffic congestion in Lagos, Nigeria. This leads to additional effects like exhaust pollution and global warming. Additionally, the condition is similar in Nairobi, Kenya. Relatively, Jackson (2018) made a wake-up call for proper maintenance management requirements in Tanzania.

Fan and Beukes (2021) pointed that, productivity of passengers' transportation can be improved with effective maintenance management. Additionally, amount of profit is dependent on the quality of relevant services. Furthermore, performance of transportation operations can be guaranteed with proper planning of relevant costs. Otherwise, the project cannot operate sustainably, unless it is backed by funds from other sources.

Shayo (2021) postulated that, availability of passengers' can be guaranteed following reliability of relevant service. Again, amount of time spent in travelling is among the factors affecting customers' satisfaction. But the service can only be assured by reliable vehicles. This can be challenged mainly by technical faults or failures leading to breakdowns

Ifeanyichi, et al. (2021) declare most of vehicles 'breakdowns result from delays in routine preventive maintenances. Also, poor budgeting of funds makes the situation worse. Evidently, the vehicles need regular changes of engine oils, filters and other failed parts. This is helpful in keeping-up to vehicles' conditions, performances and productivity.

Wilfred, et al. (2019) pointed vehicles' breakdowns delays key organization functions such as passengers' services provision. Again, Mgonja and Utou (2017) pointed a number of other losses resulting from repairing of failed vehicles, such as loss related to perishable goods. Also, Lwesya, et al. (2021) alerted on the hardships of removing defective buses from the road traffic systems by breakdown services, caused by their weight or tonnage.

Rwakarehe (2022) indicated how other road traffic challenges like vehicles crashes affect traffic flow. This is another source of embarrassments to passengers. The persistence of these incidences affects economic activities and sectorial development. More than that, they reduce standard of living for people due to resulted pollution and other safety issues.

Distinctly, body of knowledge is sufficiently covered with information on road transport and relevant services provision in a global context. Exploration has been done in Europe, Asia, South Africa, Kenya and Tanzania. Certainly, revised literatures do not contain substantial information linking maintenance management and passengers' service sector. To improve passenger services delivery, this study examined the effect of automobile maintenance management in Ilala Municipality, Tanzania."

Problem Statement

Rwakarehe (2022) declared roads traffic congestion being amid the leading mobility challenges in urban areas. The condition is even worse during peak hours, basically during the morning and evening. Again, it has been another source of time wastage, fatigue, air pollution and low productivity. Dasgupta, et al. (2020) pointed that, about 655 billion Tanzanian shillings are counted as annual losses due to overcrowded road traffic systems. Similar losses include excessive fuel consumption and deprived economic activities.

Among related surveys conducted in Tanzania, Starkey, et al. (2019) studied on effects of low volume countryside roads construction and maintenance on countryside transport services. It further indicated importance of upgraded countryside transport services on accessing market places, medical services, schools and other societal and economic activities. Again, it showed importance of small-scale countryside roads on facilitating transportation of passengers and goods in rural areas. Furthermore, this study focused on assessing effects of automobile maintenance management on passengers' services delivery in Tanzania, case of selected automobile fleets in Ilala Municipality.

Objectives of the Study

The objective of this study was to assess effects of automobile maintenance management on passengers' services delivery in Tanzania. This study relied on identifying effects of automobile maintenance management on passengers' services delivery in Tanzania; determined extremity to which automobile maintenance management affects passengers' services delivery in Tanzania; determined benefits and methods of improving automobile maintenance management relative to passengers' services delivery in Tanzania; and developed automobile maintenance management model for improving passengers' services delivery in Tanzania.

Research Questions

To achieve above specific objectives, the study based on the following questions:

RQ1: What are the effects of automobile maintenance management on passengers' services delivery in Tanzania?

RQ2: How is extremity determined on the effects of automobile maintenance management with respect to passengers' services delivery in Tanzania?

RQ3: How can the benefits and methods of improving automobile maintenance management be determined relative to passengers' services delivery in Tanzania.

II. Literature review

Khanzode and Sarode (2020) define literature review as surveys made on academic or intellectual databases that closely relate with particular research topics or trending issues. Some of them are journal articles, conference proceedings and books. Snyder (2019) declares, literature review enables academicians to acquire new information related to particular research topics. Again, it presents major outlines of definite data, analysis or critiques based on the most contemporary information on specific study areas. This review discusses various research methodologies and recommendations for future researches.

Thus, this chapter comprises a set of reviewed concepts and theories. In addition, it presents empirical analyses allied to automobile maintenance management and passengers' services delivery in Ilala, Dar es Salaam. It partly defines key terminologies and concepts, and reviews theories relevant to the study. Again, it appraises previous empirical studies, which revealed a research gap that has to be filled by this study. Correspondingly, it presents a conceptual framework of the study.

Definitions of Key Terms

Automobile

Nduka, et al. (2019) define automobiles as vehicles embedded with self-driving abilities. They are powered by engines, which facilitate mobility. Furthermore, they are road transport modes used to carry goods and passengers' from one place to another. Du and Lin (2019) declare automobiles being prominent part of road transport. In addition, Tasgaonkar, et al. (2020) cited cars, trucks,

vans and buses as examples of automobiles. In this study, reference is made of tour, commuter and intercity passengers' services only.

Maintenance Management

Jun, et al. (2015) define maintenance as a number of managerial and technical actions performed to restore the functionality of an asset within its useful life-cycle. Merriam Webster Dictionary (2019) pointed that, maintenance combines actions which aim to retain assets to good working states by repairing, adjusting, calibrating, cleaning and replacing failed parts. Thus, maintenance involves actions targeting to reestablish standard conditions of facilities, machines, device or equipment.

da Silva, et al. (2020) postulated that, management of assets should be done properly so as to attain objectives set by organizations. Again, good performance monitoring and evaluation on maintenance activities is mandatory. Alsyoud, et al. (2021) mentioned ISO 55000 benefits on assets management being; enhanced financial performance; risk management; enhanced quality of products and services; established social responsibility; validated compliance; improved reputation; enhanced efficiency and effectiveness.

According to Shubinsky and Zamyshlaev (2022), ISO 55000 focuses on realizing coherence between assets' usability, its costs, associated risks and anticipated performance. This means, failure to accommodate relevant product or maintenance costs will result into reduced performance, thus increasing possibility of related risks to occur. Therefore, passengers' services providers should consider automobiles maintenance as a vital role in accord with ISO 55000 standards for asset management requirements.

Evidently, (Hemmati, et al. 2018) categorized maintenance approaches into corrective maintenance, planned preventive maintenance and predictive maintenance. In addition, preventive and predictive strategies base on active strategy and corrective maintenance as a reactive approach. Again, Total Productive Maintenance (TPM) retains performance of facilities with minimal failure rates and reliability centered maintenance, which is preferably used in aviation, the oil and gas, armed forces and nuclear power plants.

Furthermore, (Osmani, et al. 2020) identified corrective maintenance, urgent case maintenance, predictive maintenance and preventive maintenance as commonly used options in up keeping the functioning of photovoltaic systems. Again, (Ramere and Laseinde 2021) pointed preventive maintenance, breakdown maintenance, predictive maintenance, condition based maintenance and total productive maintenance being strategically important in automobile industry. Accordingly, (Morales Méndez and Rodriguez 2017) recognize TPM strategy in preventing losses and enhancing productivity, particularly in automobile spare parts manufacturing sector.

Nevertheless, this study focused on effects of Preventive Maintenance, Corrective Maintenance, Condition Based Maintenance, Total Productive Maintenance and Total Productive Preventive Maintenance practices in Tanzania. This was done with respect to relevant study variables. In particular, it engaged selected number of identified stakeholders, operating within Ilala Municipality, Dar es salaam-Tanzania.

Passengers Service

Olivo, et al. (2019) defines a passenger as person who travels from one point to any deemed destination using passengers' services vehicles. Irtema, et al. (2018) proposed that passengers should be served well, to meet their satisfactions. Evidently, this should be in accord with the fares paid for the same. Likewise, Deb and Ahmed (2018) indicated that, the quality of city bus services delivery is vital to passengers' satisfactions.

Municipality

Peterson Obara and Cliff Ouko (2011) define municipality as an administrative entity of a particular territory and population. It is a town that is normally self-governed, usually by a mayor and a council. According to Guzman and Oviedo (2018) passengers' transport plays a potential role in facilitating mobility and development for urban populaces. Furthermore, Anikin, et al. (2020) called-for municipalities to upgrade passengers' services delivery within particular populaces. Similarly, it is proposed to study effects of automobile maintenance management on the passengers' services delivery in Tanzania. Thus, the study involved some of the key automobile fleets within Ilala Municipality.

Importance of Automobile Maintenance Management in Facilitating Passengers' Services Delivery

Öztürk and Öztürk (2019) declared importance of effective maintenance management for accommodation facilities, since it ascertains customers' satisfaction. Olugu, et al. (2021) as well pointed that, effective maintenance practice is essential for successful production, due to increased availability, reliability and maintainability of facilities. Again, Soesatijono and Darsin (2021) pointed that, importance of maintenance management is implied by its effects in reducing breakdowns of assets. Again, Giri, et al. (2020) indicated that, any increase of downtimes reduce amount of profits that firms can make.

In view of that, Vujanović, et al. (2018) revealed importance of automobile maintenance management in reducing fuel or energy consumption within automobile fleets. This in turn maximizes profits earned by the firms. Again, Kfita and Drissi-Kaitouni (2018) proved that, maintenance management increases vehicles availability in a particular fleet. On another hand, ÖZCAN, et al. (2020) revealed importance of maintenance management role in reducing interruptions of organizational activities.

Evidently, Bubou, et al. (2017) indicated prominence of maintenance and management of organizational assets in social services delivery. Furthermore, Abbas, et al. (2020) indicated the necessity of having asset managers and maintenance engineers, for effective running of potential projects successfully. Again, Kankaew (2020) postulated that, staff should be customers' oriented so as to offer the best possible services, to meet their satisfactions. Thus, passengers' services providers should employ staff who can improve effectively automobile maintenance management practices, to enhance business settings.

The general practice indicates that, good maintenance management reduces downtimes and repair costs for assets. Further, it enables automobiles to operate more efficiently. Accordingly, good management practice increases profit in the business settings. In that regard, this study examined effects of automobile maintenance management on the passengers' services delivery in Tanzania. In addition, a number of automobile fleets operating within Ilala Municipality were chosen the cases of study.

Theoretical Review

Okoli (2019) states that, theories are important supportive parts in academic researches and articles. The reason is, they form basic conditions for publications' requirements. Therefore, any standard research requires a concrete theoretical background.

For that reason, this study will adopt and use three underpinning theories. These are; Resource Based Theory, Institutional Theory and Human Capital Theory. The relevant auxiliary part will be used to define key issues related to maintenance management on the sustainability of organizational operations in Dar es Salaam, Tanzania.

Resource-Based Theory

Ahlemann, et al. (2021) states that, Resource Based Theory (RBT) can be used effectively in explaining values creations by using Information Technology. Thus, success of an organization depends much on utilizations of owned resources. The rate at which resources are consumed, determines relatively levels of successes of the firms. With regard to this study, RBT shows relationships between owned resources and success of the firms, in relation to other external reasons.

Abdurrahman and Yusuf (2018) indicated precisely, RBT is employed to recognize value added to the owned assets. These are such as machineries, automobiles, facilities and the same, with the effect of maintenance management practices. In turn, it examines the earned value on the sustainability of organizational functions. Lin and Vlachos (2018) pointed that, management of transportation services requires consistent rationing of resources, to improve the quality of services offered and meet customers' satisfactions.

Freeman, et al. (2021) postulated that, RBT is linked with sustainability as a part of strategic management, to imply competitive advantage. Accordingly, Yu, et al. (2018) cited on how RBT stresses on being sustainably competitive and make the most of profits in the business. This theory considers people as instruments used to attain competitive advantage. In a similar way, people are the motive to the performance of organizational functions. Further, Banerjee, et al. (2020) identified preferences commonly made by the passengers in choosing deemed services. It is clear that, RBT helps organizations to concentrate on using internal resources to sustain the market forces.

Institutional Theory

Berthod (2018) states that, Institutional Theory is the basis for organizational designs and conducts. The theory indicates that, all organizations are interrelated and that they are dependent on one another. Fulfilling customary requirements validates organizations. Furthermore, it reduces uncertainties with increasing stability of organizational operations.

Bag, et al. (2021) indicated that, external factors drive organizations to organize their important resources for capacity building. Relevant benefits are characterized by circularity of materials and reduction in costs. In addition, it supports sustainable services delivery. The main purpose being to earn competitive advantages in business settings.

Human Capital Theory

Hitka, et al. (2019) define Human Capital as capabilities possessed by a person or people in making products, give ideas or serving customers in various market conditions. The abilities are distinctly appraised by knowledge, skills and other attributes that help to meet organizational or societal goals. In addition, Mulia and Saputra (2021) stated that, human capital can be improved by educating employees and upgrading their working facilities.

Kucharčíková and Mičiak (2018) indicated an increase in passengers' satisfaction with respect to services provided. This is contributed by skills, knowledge and communication abilities of relevant services' providers. Suthatorn and Charoensukmongkol (2018) indicated that, staff trainings should not base only on abilities of serving the customers' or passengers, but also other qualities such as cultural variations in passengers' prospects.

Cara (2020) considers Human Capital as an approach of determining the benefits earned after achieving a particular level of education. Again, Hendarmin and Kartika (2019) revealed that, Human Capital considerably increase productivity. For that reason, this study examined benefits of using trained and competent staffs in managing automobile fleets' maintenance roles, in relation to passengers' services delivery in Tanzania. The focuses being on tours, commuter buses and intercity buses services within Ilala Municipality.

Accordingly, theoretical literature reviews reveal Resources Based Theory closely relates to this study. Basing on Institutional Theory, interdependence between organizations depends much on human resources employed. The employees make the core part of Human Capital, considering their levels and qualities of education. In a nutshell, both Institutional Theory and Human Capital Theory explain how can organizations use resources such as employees, assets, and the same, to optimize their work performances. Hence, Resources Based Theory combines essentials of other relevant two theories.

Empirical Literature Review

Lidolf and Pasco (2020) pointed that, empirical part presents methodical literatures of latest studies related to a particular study topic. Mainly, previous studies focused on analyzing weaknesses and strengths of passengers serving entities as a result inappropriate automobile maintenance management. Another part dwelled on identifying causes and effects of relevant challenges. Evidently, the studies have added significant inputs in the scholarly knowledge database. Nevertheless, the studies have not clarified well on how automobile maintenance management could enhance productivity and profitability of passengers' services delivery in Ilala Municipality, Dar es Salaam-Tanzania.

Productive Passengers' Services Delivery

Bratianu, et al. (2020) declared knowledge being strategically used by organizations in a good turn of economic benefits, thus it can enhance considerably the performance of a firm. Likewise, Takeuchi, et al. (2022) surveyed on privately owned passengers' mobility services in Japan, focusing on relevant costs, productivity and cost-effectiveness. Again, Chansky and Modica (2018) declared passengers' services in improving economic conditions in urban areas, by creating job opportunities.

Likewise, (Borovyk 2020) pointed dependability between productivity of passengers' services and availability of relevant customers, vehicles' worthwhileness and maintenance management roles. In view of that, Ferreira and Dias (2019) indicated that, transport services facilitate economic growth through production and service sectors. Again, Puri and Verma (2017) indicated that, poor treatment to passengers' results into disappointed customers, thus failing to deliver the deemed business performances.

According to Bannikov and Sirina (2020), passengers' service vehicles are designed with distinct characteristics that meet relevant technical and performance requirements. In addition, Sifonte and Reyes-Picknell (2017) indicated that, failures in assets' operations result into breakdowns, road safety concerns, poor services and low productivity. Thus, Shen, et al. (2020) reminded on the need of proper automobile maintenances and management, to retain specified functional and safety requirements.

Maintenance Management Strategies for Productive Tours Service Delivery

Knowles and Westcott (2015) pointed that, tours services include organizing trips or safaris in relation to travelers' requirements. Cheng, et al. (2018) further cited the services being mutually reliant with passengers' serving companies and hotels. In addition, Camilleri (2018a) mentioned some of common tourism packages as urban visits, rural visits, seaside trips, cultural or heritage visits, sports trips, business trips and study visits.

Kolupaev, et al. (2018) stated that, tours services is a part of passengers' transport services. Evidently, Arshad, et al. (2018) postulated that, tour services sector highly supportive to economic development. Further, Camilleri (2018b) declared the sector being a vital contributor of foreign bills, thus it should be properly managed. Likewise, Shen, et al. (2020) reported that, passengers service vehicles must be maintained correctly. Again, Lancot (2017) reminded on the challenges related to automobiles' embedded-diagnosis systems and their maintenance requirements.

Liu and Wu (2019) pointed that, productivity improves production and economic growth with relatively similar inputs or resources qualitatively and quantitatively. Again, Hussain, et al. (2020) state that, productivity of tour services can be greatly affected by poor maintenance plans, leading to unscheduled downtimes. In addition, Birago, et al. (2017) states that, congested road traffic systems and environmental pollution are partly related with automobiles breakdowns, resulted from bad maintenance practices.

Ngo, et al. (2018) indicated that, tour services can be run sustainably, with the assurance of steady availability of customers. It was reported by Nocca (2017) that, tour operations contribute nearly 5% of carbon dioxide emissions in a global context. Again, Bhatt, et al. (2019) reported that, tourism is held accountable for its 4.6% in global warming. Furthermore, Odogun and Georgakis (2019) suggested good maintenance practices, to optimize efficiency of automobiles' performances in terms of fuel consumption and exhaust gases emissions.

Rana, et al. (2022) mentioned some of harmful automobiles evaporative emissions, such as exhaust gases and noises. Daily and Peterson (2017) postulated that, costs of maintaining engines can be reduced by good maintenance plans. Also, Webb, et al. (2020) pointed that, poor functioning of vehicles' systems cause safety issues to passengers and their baggage. Relatively, Carvalho, et al. (2019) stressed on the importance of effective vehicle maintenances in optimizing their management and usability.

Maintenance Management Strategies for Productive Commuter Bus Services

Ma, et al. (2017) define commuters as day-to-day transport services, providing repetitive travels between particular destinations within towns and cities. According to Targino, et al. (2018), commuter trips involve stoppages at definite terminals, for picking and dropping passengers. In addition, Liu, et al. (2020) indicated that, commuters operate between two extreme destinations to complete

specified routes. For instance, Chengula and Kombe (2017) pointed that, DBRT setup is composed of a number of routes, transporting passengers between Kimara to Kivukoni and Kimara to Kariakoo.

Bădău, et al. (2020) indicated importance of guiding transporters for effective commuter services delivery. It was revealed by Jannah, et al. (2020) that, productivity and efficiency of commuter services can be achieved with optimum assets utilizations. Again, Dou, et al. (2021) identified profit as the main target of transport companies. Further, Deveci, et al. (2022) revealed excessive commuter services costs being caused by poor maintenance, excessive fuel bills and taxes. Further, Bartle and Chatterjee (2019) mentioned Netherlands, France, Denmark in considering travelling costs as deductible expenditures.

Furthermore, Basu, et al. (2020) cited two forms of commuter bus services being captive oriented and choice based passengers. In addition, Pettersson (2019) mentioned two forms of city commuter licenses being; those making two journeys in a day and others of which, the number of trips made in a day is not limited. Atombo and Wemegah (2021) claimed that, commuter bus services carry passengers within districts capitals, major townships, municipalities and cities. Again, Majumdar, et al. (2021) gave the fact that, despite of challenges linked to urban commuter services such as congested traffic systems, customers' should be protected and satisfied.

Clearly, Prashar, et al. (2020) declared improved mobility schemes, safety and environmental issues being necessary parts of automobiles maintenance management, with the aid of 5G and IoT technologies. Likewise, Zhuang, et al. (2019) pointed that, road traffics control and road safety can be enhanced with IoV technology. Again, Sharma and Kaushik (2019) itemized possibility of making high improvements by enhancing safety in roads networks and traffic systems. Also, Boryaev, et al. (2020) recounted, environmental protection can be achieved with good automobile maintenances.

Again, de la Torre, et al. (2021) declared transportation being safe for sustainable improvement of the coming humanoid generations. Objectively, urban transport operations have been very helpful in social-economic standpoints. Mainly, sustainable transportation bases on three perspectives; social conditions improvement, economic development and environmental protection. Strategically, STS should contribute in improving living conditions of the people by reducing traffic congestions and pollutions.

It was postulated by Soltanali, et al. (2019) that, productivity in automotive businesses can be greatly improved by assuring availability, maintainability and reliability of relevant assets. Relatively, Amberg, et al. (2019) declared a significant reduction in frequency of breakdowns, with increased productivity and reduced maintenance costs. Therefore, automobile maintenance management can potentially improve commuter bus services delivery in Ilala Municipality, Dar es Salaam.

Maintenance Management Strategies for Productive Intercity Bus Services

Javid and Sadeghvaziri (2022) define intercity service as bus trips made on a regular basis, over longer distances than that covered by commuter services. Accordingly, Walsh (2017) reported, intercity buses have been facilitating people's movements in huge numbers, all over urban and rural parts of America, as from early 1900s. Kuo, et al. (2022) declared maintenance being important in assuring intercity bus service delivery. In particular, it improves management as it avoids interruptions in transport planning, and management of automobiles' schedules and rosters.

Damsere-Derry, et al. (2021) revealed the necessity of efficient and affordable bus services in enabling people to engage themselves in their daily activities. According to Taufik, et al. (2021), intercity bus services can be efficiently managed using IoT technology. Again, Vijayaraghavan and Rian Leevinson (2020) recognized GPS technology being useful in reports generations, assets tracking, tickets provisions and monitoring of buses conditions and localities.

Nevertheless, Sam, et al. (2019) stated that, buses should always be prevented from recurrent breakdowns for the sake of passengers' protection and satisfaction. On the hand, Ambriško and Teplická (2021) asserted significance of proper maintenance schemes for bus fleets, to avoid relevant challenges like shortage of spares, unscheduled breakdowns and excessive maintenance costs. Evidently, intercity bus fleets managers should observe maintenance standards, to meet all legal, safety, technical and customers' requirements.

What's more, Corazza, et al. (2018) reminded on how early detection of possible causes of vehicle failures lengthens lives of its components. Again, Pietrzak and Pietrzak (2021) notified on how buses' breakdowns cause undesirable environmental effects, particularly pollution. Evidently, Agustiad and Cudney (2018) postulated that, effective maintenance management can reduce number of grounded vehicles due to unplanned downtime. In addition, Poór, et al. (2019) recommends TPM strategy to optimize efficiency of assets utilizations, lowering the costs of maintenance and downtimes.

Murad, et al. (2020) postulated that, productivity, profitability and effectiveness of a company can be achieved through good maintenance management practices. Again, Jamkhaneh, et al. (2018) indicated a positive correlation between CMMS and top management support, allocation of resources, decision making and workers participation, in revealing effective TPM. It was evidently shown that, sustainability of a company depends greatly on the maintenance function, since it affects services and products qualities, quantities and relevant costs.

Nevertheless, Begna (2020) describes TPM as a strategy used for making improvements within organizations, whereby maintenance team, operations personnel and other management entities work as a team towards established goals. According to أسعد and عليان

(2017), productivity of intercity passengers transportation can be rated by fleet utilization, workers' productivity, fuel consumption, number of routes made, number of passengers' served and total returns earned in a given period. Khalid, et al. (2018) on another hand recommended enhancement of productivity, decrease unemployment rate and maximize profits for better future of the intercity bus service providers.

Effects of Maintenance Management on Passengers' Services Delivery

Rahman, et al. (2017) identified bus service as the main mode of passengers' transportation across various destinations such as townships, cities and rural areas. Again, Hadiuzzman, et al. (2017) pointed, effectiveness of relevant service can be assessed through customers' insights. In addition, Sam, et al. (2018) indicated that, the quality of a particular service is greatly influenced by its reliability and accessibility.

Jiang, et al. (2018) indicated that, deterioration of assets affects much reliability of relevant operations. Accordingly, Dossou (2018) declared the capacity of preventive maintenance in reducing breakdowns of assets. Antikainen, et al. (2018) state that, maintenance enhances availability and reliability of assets, thus lengthens their lifecycles.

Relatively, Nowakowski, et al. (2019) revealed that, maintenance management improves performance of operations and market competitiveness, since costs reduce considerably.

Nevertheless, Thilakshan and Bandara (2019) declare transportation being the leading sector in social and economic development. It is thus essential for sustainable development. Considerably, Dai and Menhas (2020) believes the fact, sustainable transportation can speed-up economic development as determined by agenda 2030 for Sustainable Anas, et al. (2021) declared the fact, maintenance of transportation facilities optimizes performance of relevant operations.

In addition, Yuan, et al. (2018) indicated that, maintenance and repairs are routine works in running transportation activities. According to (Su, et al. 2017), poor planning of maintenance schedules can reduce significantly the performance of transportation activities. Furthermore, (Abdel Wahed Ahmed and Abd El Monem 2020) indicated that, high demand of public transportation requires the service to be available, safe and reliable.

Again, Istrefi and Zdravevski (2020) declared IoT technology being capable of improving planning and managing of transport operations. Mitroi (2021) states that, as an integral part of preventive maintenance, IoT also enhances the performance of vehicles' parameters. Sustainability of transportation companies is dependent on the quality of services provided, competitiveness in the prices, and scarcity of fuel and drivers. This can be achieved with the aid of Intelligent Transport System (ITS). Arena, et al. (2020) pointed that, ITS uses sensors, processors, controls and communication technologies to improve mobility, safety and efficiency in road transport operations.

Besides, Gidebo and Szpytko (2020) postulated that, Telematics is another evolving technology, having a significant contribution to the sustainability of transport operations. In a similar way, Huk and Kurowski (2022) pointed that, telematics uses GPS and OBD in tracking the movements of cars, equipment, trucks and other mobile assets in a particular fleet. The interface is used for sharing real-time data within organizations. Thus all data related to vehicles' maintenance, repairs, services and uses can be easily traced. In addition, fleets' performance can be efficiently managed.

Primarily, Tezel and Aziz (2017) pointed sustainability of any organization being dependent on how it strategically invest, perform its maintenance roles, manage safety issues, energy management and productivity improvement. Again, Tursunbaevich and Axmadjonovich (2020) make certain on productivity being amongst prominent issues in relation to assets selection, for the welfare of the business. Yet, Florence, et al. (2018) pointed out durability of assets as the base for economic change and improved shareholders' worthiness.

Generally, revised literatures revealed maintenance management being the core function in passengers' services delivery, among many other relevant sectors. Objectively, it establishes steady running of organizational functions. More than that, it continuously facilitates improvements in productivity and safety of relevant assets. This can be done by foreseeing all the failures or breakdowns and strategizing relevant maintenance procedures. In that regard, this study revealed the effects of automobiles maintenance management on passengers' services delivery in Tanzania, considering selected automobile fleets in Ilala Municipality, Dar es Salaam as the case of relevant study.

Automobile maintenance management model for passengers' services delivery in Ilala Municipality, Dar es salaam-Tanzania.

(Nguyen 2016) defines models as mathematically configured objects or sets, providing particular relationships. Accordingly, (Morgan 2018) pointed that, models can be used to indicate relevance amid complex subjects. Furthermore, (Frigg and Nguyen 2017) postulates that, models facilitates acquiring and organizing of scientifically based knowledge. Again, they are helpful in discovering natural settings of subjects involved in a particular study.

(Law 2019) pointed that, validated models are helpful in making key decisions that closely relate with real life practices or systems. (Sidey-Gibbons and Sidey-Gibbons 2019) pointed that, further than realizing correlations among particular variables, the models

are used to predict outcomes reliably from relevant types of data sets. Yet again, (Haynes and Fotheringham 2020) revealed models being effective in predicting conditions related particular data.

On the other hand, (Breheny and Burchett 2017) pointed that, regression models isolate related outcomes and descriptive variables, keeping additional variables unchanged. Again, multiple regressions compare relevant descriptive with effects of more complex situations. According to (Pajouheshnia, et al. 2016), regression models fixed to finite populaces' samples should choose proper method of estimations in order to reduce errors in the predicting variables and those of populations.

Similarly, (Khandelwal, et al. 2017) compared Multiple Regression and Empirical models, which were further suggested for predicting ultimate particle speed. Accordingly, comparisons and evaluations on the degree of achievement made by the suggested models were indicated by coefficient of correlation, variance and root mean square error. (Riley, et al. 2020) indicated that, development of predicting models is done by regression modelling. Again, development of a good predicting model requires data sets related to a specific population. In addition, such data sets should contain both predicting values and relevant outcomes.

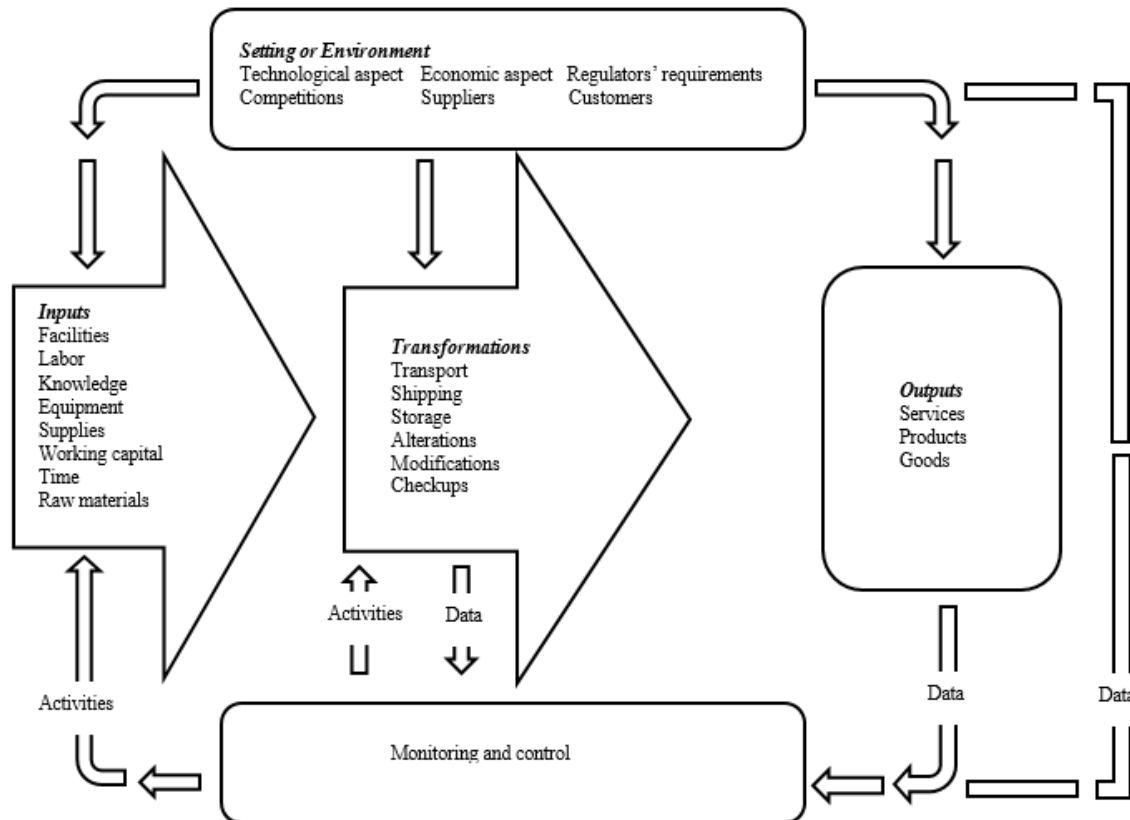


Figure 1: Input/output Transformation Model (Noor et al, 2020)

In the same way, this study will use MLR model to statically examine correlation between relevant study variables. The reason is, relevant analysis is an indication on effects of study variables related to a particular research topic. More than that, the analysis helps to determine factors that are mostly relevant, and others which are not. Again, the same indicates influences amongst relevant factors.

Research Gap

Globally, striving for affordable, reliable and sustainable public transport systems for societal and economic development is evident. In Tanzania, (Loyde 2020) studied on factors affecting transport systems in urban areas, case of DBRT. The study based on selected issues like travelling speeds, steadfastness, branding of the serving entity, safety and capability of serving the relevant public. It was further recommended that, beyond limits of the given study, attention should base on technological and political contexts.

In addition, further studies were recommended with the focuses on economy, environment and society related issues. Evidently, study results have potential contributions on developing the identified areas. It was further recommended to assess effectiveness of passengers' transportation in townships, relative to public transport networks beyond DBRT, city commuter services being one of them.

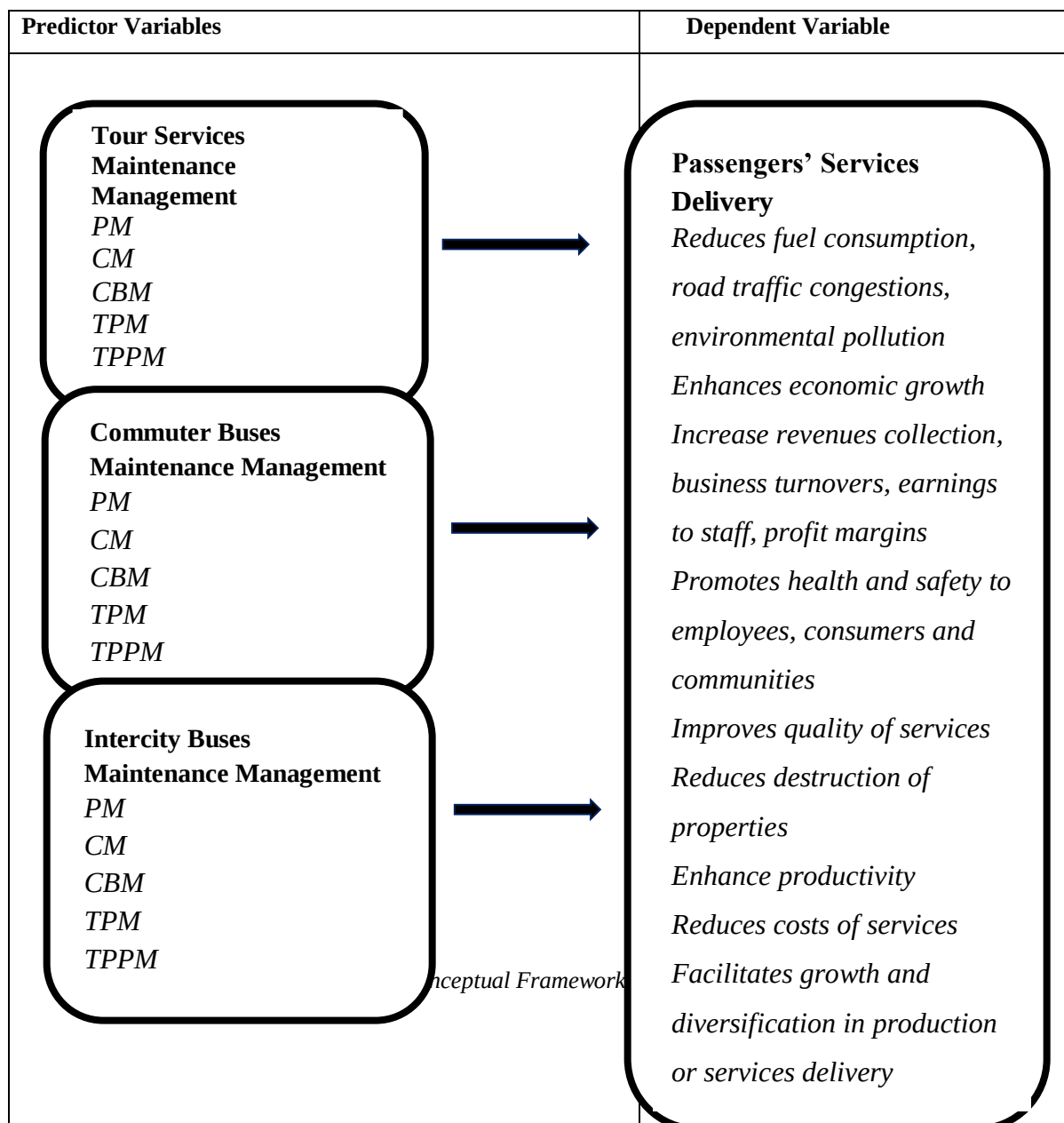
Definitely, the body of knowledge is adequately covered with information on passengers' transportation service provision sector in the global context. Exploration has been done in Europe, Asia, Africa, Kenya and Tanzania. Certainly, the literatures do not contain

substantial information linking automobile maintenance management and passengers' services delivery. Therefore, this study examined effects of automobile maintenance management on the passengers' services delivery in Tanzania, taking selected automobile fleets in Ilala Municipality as the case study.

Conceptual Framework

Qiu, et al. (2021) defined conceptual framework as a setup of interrelated concepts. It presents summarily the study variables and their hypothetical relationships. For the same purposes, the conceptual framework was formed, to facilitate data collection process. The conceptual framework in Figure 2.1 syndicates three independent variables; automobile maintenance management in tour services delivery; automobile maintenance management in commuter bus services delivery and automobile maintenance management in intercity bus services delivery. These variables were examined separately, to realize their effects on the performance of passengers' services delivery in Tanzania.

Their significances are going to be indicated in respect to environmental conservation, economic development, enhanced health and safety to employees and communities. In addition, it is predicted to reveal improvements in quality of the services, enhanced productivity, increased profitability, reduced costs of services, also the growth and diversification in passengers' services deliveries in the country.



III. Methodology

Study Design

Sileyew (2019) defines research design as a framework of conditions governing data collection and their analyses. It is systematically and economically structured in relation to study objectives. In that way, it facilitates in answering the questions related to the identified problem accurately. Study designs are categorized as review, correlation, experimental, descriptive, semi-experimental and meta-analytic type. In addition, descriptive-longitudinal case studies are the commonly known types of research designs.

This study was conducted through a cross-sectional survey design. The choice of this design was made due to its relevance and simplicity in collecting the relevant data. More than that, to examine thoroughly the study variables. Again, the design suited in preparing a report in relation to the main objective of the study.

Approach

Kankam (2020) defines approach as a collection of procedures followed in conducting a given study. This study chose quantitative approach in data collection relative to its objectives. The survey was anticipated to be done within a short time, since the approach supports collection of numerical data.

Study Area

The study was conducted in Ilala Municipality, Dar es Salaam-Tanzania. The most prominent commercial, business and transportation hub, located at the eastern part of the country. Issa and Shatta (2021) postulated that, Dar es Salaam city is surrounded by Pwani region, also bordered by Indian Ocean to its east side. Charles (2018) indicate that, Ilala is resided by a total of 300,660 families. The community living in the area is a mix of various natives, tribes and religions, among which are Christians, Muslims and Hindu.

Lupala (2021) pointed that, among 147,557 hectares documented by the authority, only 70% of the same are built, that is 115,372 hectares. Again, Krüger, et al. (2021) indicated that, the city is occupied by about 6.7 million populaces. Sindato, et al. (2020) cited Ilala district holding the highest dense human populace, each square kilometer being resided by 3,133 persons. In adding, Chilewa (2019) insisted importance of improving passengers' transportation services, for societal inclusion and wellbeing.

Ngwegwe (2019) declared Dar es Salaam being the busiest city in Tanzania having plenteous socio-economic activities. In addition, Peter and Yang (2019) pointed that, major part of the city is dedicated on commercial deeds and revenue generation. Mahugija, et al. (2018) recognize Dar es Salaam being occupied by enough industrial manufacturing and processing activities. In that regard, the area suited the requirements of the study, since all strategic stakeholders in production, manufacturing and transportation operate in the city. So, these were the main sources of data required.

Study Population

Thacker (2020) defines population as an established number of entities such as a group of people, animals, objects, measurements, buildings, etc having specific features or characters. It is a group from which a study sample is chosen. Thus, populations are composed of similar objects, which provide data for the specific study.

This study involved Ilala Municipality populaces, based in the transportation sector. These are such as automobile maintenance managers, supervisors, technicians and operators. The study was done independently among the classified entities. Each cadre engaged a balanced number of participants. The chosen respondents were handled properly to achieve the study objectives. Table 3.1 shows the analysis of the particular study populace.

Table 1: Study Population Analysis

S/N	Licensed Passengers Services Vehicles per Category in 2021	Total
	Tour operators	1069
	Commuter buses	6598
	Intercity buses	1709
	Total	9376

Source: LATRA (2022)

Sample Size and Sampling Techniques

Sample size

Bhardwaj (2019) defines sampling as a method used to select samples from entities or collections of populaces, to suit requirements of a particular study or research. The accuracy of the study is dependent greatly on the sampling method used. With regard to this study, sample size used was 100 people, considered to be rational and reasonable.

Again, Memon, et al. (2020) define sample size as a subsection of a population that must ensure sufficiency of data, so as to make a valid conclusion. The sample size was computed through a measured formulation. Adhikari (2021) indicated that, a sample size for quantitative studies can be determined by using the following formula:

$$n = \frac{N}{1 + N \cdot e^2}$$

Again,

$$n = \frac{9376}{1 + 9376 \cdot 0.1^2} = 100$$

Where:

n = Sample size or number of participants required

N = Study population = 9376

e = Standard sampling error (10%) is accepted or tolerated.

After entering values of corresponding variables in the given formula, 100 participants were determined to suit the level of accuracy required for the given study. This sample size matched with an argument made by Ahmad and Halim (2017) who indicated that, studies based on factor analysis, should have more observations than variables. Similarly, Rogers, et al. (2020) indicated that, minimum sample size must be 50 observations. Additionally, Funder and Ozer (2019) declares studies involving greater samples are likely to yield more precise and less bewildering results than those with smaller samples.

Table 2: Sample Size Distribution

S/N Respondents	Population Size	Sample Size	Data Collection Method
Tour operators	1069	11	Structured Questionnaires
Commuter Buses	6598	70	Structured Questionnaires
Intercity Buses	1709	19	Structured Questionnaires
Total	9376	100	

Source: Research (2025)

Sampling Techniques

Elfil and Negida (2017) define sampling technique as a process of choosing a representative populace from an objective populace. Stratton (2021) mentioned probability sampling and non-probability sampling being the commonly known types of sampling techniques. Probability sampling techniques comprise systematic sampling, stratified random sampling, multi-stage sampling, cluster sampling and simple random sampling. In addition, non-probability sampling methods are snow-ball sampling, purposive sampling, convenience sampling and quota sampling.

This study used a duo of purposive sampling and simple random sampling methods in selecting participants. The respondents were grouped in relation to the types and sizes of firms, relative to their sectors like production, manufacturing and transportation entities. The given process aimed to standardize or normalize the study sample.

Data Collection Methods

Gomez-Diaz and Recio (2022) define research data as records of facts used in academic or scientific researches or studies, to validate relevant results. They can be in the forms of texts, numerals, sounds and video. Data represents the matters that need to be examined. Furthermore, it is a set of raw facts, prepared in a certain way that requires to be processed. There are two main types of research data, primary data and secondary data. Sadan (2017) indicated that, validity of study results depends much on the quality of data collected.

Primary Data

Baral (2017) defines primary data as facts obtained from the origins or sources to fulfil research objectives. In addition, they are also known as internal data sources since data are gathered from the particular participants or areas. Again, they are gathered from people who are directly associated with the relevant research problems and objectives.

Correspondingly, the prospective survey engaged respondents from targeted populace residing in Ilala Municipality. Again, the questions were directed to selected individuals, deliberated as sources of statistical data on a given study topic. In that regard, the questions were prepared with proper scaling and good ordering, to relate with the respondents' opinions. The questions contained five preferences for respondents, to show their levels of accord as: 1=Low; 2=Average; 3=High; 4=Very High; 5=Extremely High.

Secondary Data

Martins, et al. (2018) define secondary data as previously collected facts, to fulfil new research objectives than original ones. Again, Harriss, et al. (2019) recognize secondary data as available documented data or those from governmental databases. They are collected for different purposes, than the primary one. Also, Kayesa and Shung-King (2021) pointed documents reviews or analyses as one of potential secondary data sources.

Relatively, secondary data for this study have been collected by reviewing local Land Transport Statistics. The report covers quarter II of financial year 2021/2022. Furthermore, the document is owned by Land Transport Regulatory Authority, LATRA.

Data Collection Tools

Kabir (2016) states that, data collection is among the most prominent steps in doing researches. Again, each study requires specific types of data which in turn should use proper collection tools relevant to a particular sample. This study used structured questionnaires in collecting primary data.

Jain, et al. (2016) defined questionnaires as instruments containing a number of questions, commonly used to collect data. In addition, Aithal and Aithal (2020) indicated that, survey-based questionnaires are composed of questions or items, aiming to provide solutions to specific research problems. Furthermore, Rahman (2020) pointed that, depending on the type of data needed for a particular research, questionnaires are classified as qualitative, for gathering explanatory data and quantitative based, for gathering data that validate specified assumptions. Again, Adhabi and Anozie (2017) recognize structured questionnaires being used in gathering quantitative data, while unstructured questionnaires are based on qualitative data.

Data Analysis

Raheja, et al. (2017) declared data analysis being important step in academic and scientific studies, particularly in performance evaluations. Again, data analysis normalizes errors that may perhaps affect study findings. Crüwell, et al. (2019) pointed that, the process improves usability of data. Additionally, data coding and storage enhance consistence of study results, following multiple uses of the same. Therefore, analysis of data was done correctly in order to recognize correlations between study variables.

Consequently, data were gathered, coded and entered into SPSS 30 program. Furthermore, data were analyzed through descriptive statistics. Besides, the study employed inferential statistics through Multiple Linear Regression (MLR) model, in assessing strength of correlations between study variables.

Hu, et al. (2019) indicated that, MLR is a broad view of Simple Linear Regression (SLR) model. The model is commonly used in analyzing multiples of statistical data sets. Khademi, et al. (2016) indicated that, estimating correlations between dependent and independent variables, linear regressions are normally fitted with Least Squares methods.

Delbari, et al. (2019) pointed that, SLRs are used to estimate linear relationships between one dependent variable and one independent variable only. Again, MLRs estimate linear relationships between multiple independent variables and one dependent variable. This study used MLR Model 1, to estimate correlations between study variables.

$$Y_i = \beta_0 + \beta_1 \text{TPPM} + \beta_2 \text{CB} + \beta_3 \text{PM} + \beta_4 \text{TPM} + \beta_5 \text{CBM} + \epsilon \dots \dots \dots 1$$

Where:

- Y_i = Dependent variable, performance of passengers' services delivery.
- β_0 = Constant term
- $\beta_1 \text{TPPM}$ = Effects of Total Productive Preventive Maintenance Management in passengers' services delivery in Tanzania.
- $\beta_2 \text{CM}$ = Effects of Corrective Maintenance Management in passengers' services delivery in Tanzania.

β_3 PM	=	Effects of Condition Preventive Maintenance Management in passengers' services delivery in Tanzania.
β_4 TPM	=	Effects of Total Productive Maintenance Management in passengers' services delivery in Tanzania.
β_5 CBM	=	Effects of Condition Based Maintenance Management in passengers' services delivery in Tanzania.
ϵ	=	Model error term or residuals

IV. Results and Discussions

Model Summary				
Model	R	R ²	Adjusted R ²	Std. Error of the Estimates
1	.713 ^a	.508	.482	.07488
a. Predictors: (Constant), TPPM, CM, PM, TPM, CBM				

Independent or predictor variables

TPPM	=	Total Productive Preventive Maintenance
CM	=	Corrective Maintenance
PM	=	Preventive Maintenance
TPM	=	Total Productive Maintenance
CBM	=	Condition Based Maintenance

Interpretations

Statistic	Value	Explanation
R	0.713	This is the multiple correlation coefficient. It measures the strength of the linear relationship between the observed and predicted values. R of 0.713 suggests a strong positive correlation.
R ²	0.508	It is also known as the coefficient of determination. The coefficient indicates that, 50.8% of the variance in the dependent variable is explained by the predictor variables (TPPM, CM, PM, TPM, CBM).
Adjusted R ²	0.482	Adjusts R ² for the predictor variables in the model. 48.2% indicates a more accurate performance measure of model, particularly when many predictor variables are contained
Std. Error of Estimates	0.07488	This value indicates the standard deviation of the residuals (errors in the prediction). The lower standard deviation indicates the closeness of the model predictions in relation to the actual values.

Summarily

The resulted regression model indicates a modest to strong fit, explaining 50.8% of the variance in the dependent or response variable, having reasonably low estimation error. The Adjusted R² indicates that, the model matches well with the related predictor variables.

ANOVA ^a					
Model	SS	df	MS	F	Sig.
1 Regression	.545	5	.109	19.439	<.001 ^b
Residual	.527	94	.006		
Total	1.072	99			
a. Dependent Variable: Performance of Passengers' Services Delivery in Tanzania					
b. Predictor variables: (Constant), Total Productive Preventive Maintenance, Corrective Maintenance, Preventive Maintenance, Total Productive Maintenance, and Condition Based Maintenance.					
The ANOVA table reviews the results of a regression analysis where the dependent variable is Performance of Passengers' Services Delivery in Tanzania and the independent variables are Total Productive Preventive Maintenance, Corrective Maintenance, Preventive Maintenance, Total Productive Maintenance, and Condition Based Maintenance.					

Defining Important Terminologies

Sum of Squares (SS) indicates the variations defined by the regression model and the part of variation that is not defined (residual).

Degrees of Freedom (df) indicates the number of predictor variables, 5 in this case, and residual degrees of freedom expounded by the formula ($n - k - 1 = 100 - 5 - 1 = 94$). Thus, this is the analysis of variances with 5 independent variables and 100 observations,

Mean of Square (MS) indicates the Sum of Squares (SS) divided by the degrees of freedom (df).

F-statistic is the ratio of the model variance to residual variance. The parameter is usually used to test general significance of the regression model.

Significance value (p-value) is the probability that the observed F ascertains the prediction accuracy. Hence, the value $< .001$ shows that, the significance of the model is very high.

Conclusively, the regression model is statistically significant ($p < .001$), indicating that at least one of the predictor or independent variables (Preventive Maintenance, Corrective Maintenance, Total Productive Preventive Maintenance and Condition Based Maintenance significantly predict Performance of Passengers' Services Delivery in Tanzania.

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	β		
1	(Constant)	-1.601	.735		-2.177	.032
	PM	.095	.053	.136	1.783	.048
	CM	.320	.079	.328	4.065	<.001
	CBM	.110	.089	.100	1.246	.022
	TPM	.387	.085	.366	4.578	<.001
	TPPM	.529	.076	.556	7.009	<.001
a. Dependent Variable: Performance of Passengers' Services Delivery in Tanzania (PPSDT)						

Developing the regression equations

The general form of a Multiple Linear Regression (MLR) equation is given as:

$$PPSDT(Y) = \beta_0 + \beta_1 PM + \beta_2 CM + \beta_3 CBM + \beta_4 TPM + \beta_5 TPPM$$

Using the unstandardized coefficients (B), the equation results into:

$$Y = -1.601 + 0.095PM + 0.320CM + 0.110CBM + 0.387TPM + 0.529TPPM$$

Interpreting the coefficients

(Constant)

When all predictors (PM, CM, CBM, PPM, and TPPM) are set to zero, the predicted value of Performance of Passengers' Services Delivery in Tanzania is -1.601. This value relates to the intercept of the linear regression model, indicating the expected Performance of the Passengers' Services Delivery in Tanzania outcome in the absence of the definite predictor variables. The particular intercept is statistically significant, (p-value of 0.032), which is below the threshold of 0.05 level of significance.

Preventive Maintenance ($B=0.095$, $p=0.048$): For each unit increase in Preventive Maintenance Performance of Passengers' Services Delivery in Tanzania increases by 0.095, holding other variables constant. However, the effect is relatively small and only marginally significant.

Corrective Maintenance ($B = 0.320$, $p = <.001$)

The analysis shows a positive and statistically considerable relationship between Corrective Maintenance and the Performance of Passengers' Services Delivery in Tanzania. Definitely, the coefficient of 0.320 shows that for each unit increase in Corrective Maintenance, the Performance of Passengers' Service Delivery improves by 0.320 units. This proposes that improvements in Corrective Maintenance activities are related with considerable improvements in passenger service delivery. Moreover, the relationship is statistically significant at the 0.05 level.

Condition Based Maintenance ($B = .110$, $p = 0.022$)

The coefficient indicates a positive relationship between Condition Bases Maintenance and the Performance of Passengers' Services Delivery in Tanzania. Again, the coefficient of 0.110 shows that for each unit increase in Condition Based Maintenance, the Performance of Passengers' Service Delivery in Tanzania improves by 0.110 units. In addition, the coefficient is statically significant since it is within 0.05 level of significance.

Total Productive Maintenance ($B = .387$, $p < 0.001$)

The particular coefficient indicates a strong positive relationship between Total Productive Maintenance and the Performance of Passengers Services Delivery in Tanzania. The coefficient of 0.387 shows that for each unit increase in Total Productive Maintenance, the Performance of Passengers' Service delivery improves by 0.387 units. The analysis exposes that the correlation between the variables is statistically significant at the 0.05 level. It is likely that, the result strengthens the validity of the study findings.

Total Productive Preventive Maintenance ($B = .529$, $p = <.001$)

The analysis shows a strong positive statistical significance relationship between Total Productive Preventive Maintenance and Performance of Passengers' Service Delivery in Tanzania. Definitely, the results show that, each unit increase in Total Productive Preventive Maintenance is related with a 0.529-unit increase in the Passengers' Services Delivery in Tanzania. Again, the significance of the relationship between the particular variables are determined by the coefficient <0.001 , within 0.05 significance level.

Using Standard Coefficients (β)

The standardized beta coefficients show the relative correlation between independent variables and the dependent variable. Again, Preventive Maintenance shows the positive effect ($\beta = 0.136$). The particular coefficient signifies it being the predictor variable having the influence in the model. Yet again, Corrective Maintenance ($\beta = 0.328$) and Condition Based Maintenance ($\beta = 0.100$) indicates strong and fair positive effects respectively, signifying their relationships with the dependent variable. Similarly, Total Productive Maintenance indicates a comparatively strong positive effect ($\beta = 0.366$), whereas Total Productive Preventive Maintenance indicates the strongest positive relationship with the dependent variable ($\beta = 0.556$).

V. Conclusion

The results show that Total Productive Preventive Maintenance is the most significant independent variable affecting the performance of passengers' service delivery in Tanzania, showing the strongest positive contribution among all predictors. Also, all the independent variables are statistically significant at the 0.05 level, which indicates the reliability of their contributions to the regression model. Notably, Condition-Based Maintenance applies a relatively similar but weaker effect compared to Preventive Maintenance in influencing passengers' service delivery performance. Overall, the model reveals a strong descriptive power, providing valued insights into the vital maintenance factors that affect the performance of passengers' service delivery in Tanzania.

VI. Recommendations

To further improve vehicle's reliability and road safety in Tanzania, policy makers must introduce and impose monitoring frameworks that demand regular vehicle inspections and necessitate good documentation of maintenance activities. Such guidelines

would encourage responsibility and ensure that vehicles remain being roadworthy. The public transport operators, on the other hand, are encouraged to implement preventive maintenance plans and invest in the training and upgrading the skills of their technical staff to improve operational efficiency and decrease the risks of vehicles failures. For impending researchers, there is a need to investigate the long-term effects of other maintenance strategies over time and crosswise several regions in Tanzania. This study would provide valued insights into the effectiveness of present maintenance practices and update the development of evidence-based strategies and interventions.

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