THE IMPACT OF TELEMATICS IN FLEET EFFICIENCY AND SUSTAINABILITY: A CASE STUDY OF GLOVO UGANDA

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UGANDA CHRISTIAN UNIVERSITY
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DECLARATION

I **Namugi Juan Samuel**, declare that this dissertation, "The Impact of Telematics in Fleet Efficiency and Sustainability" is my own independent work. It has not been submitted to any other institution for the award of any degree.

All materials, ideas and information derived from other sources have been appropriately credited and acknowledged in accordance with proper academic standards. The support given to me during the course of this work has been appropriately recognized.

I accept full responsibility for the contents of this dissertation.

SIGNED

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DATE 4/05/2026

APPROVAL

This is to certify that this dissertation on the topic "The Impact of Telematics in Fleet Efficiency and Sustainability" by Namugi Juan Samuel M23B12/095 was conducted under my supervision and guidance and is now ready for submission to the school of business for examination in partial fulfillment of the requirement for the award of a degree in procurement and logistics management.

MR. DUNCAN TUMUHAMYE

Signature..

Date..........04/05/2026..........

DEDICATION

This dissertation is dedicated to my family, who have put up with a lot over the years-the late nights, the stress, and the times I wasn't around. Their support has been unwavering and I wouldn't have made it without them.

I also want to thank my friends and colleagues for encouraging me to carry on, especially when I wanted to give up. I think I needed them more than they probably realize.

And to God, who carried me through when I didn't have the strength to carry myself. This is as much yours as it is mine.

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LIST OF ABBREVIATIONS

GPS	: Global Positioning System
UNCTD	: United Nations Conference Trade and Development
RTEs	: Road Transport Enterprises
IoT	: Internet of Things
RFID	: Radio Frequency Identification
CVRPs	: Capacitated Vehicle Routing Problems
CO2	: Carbon-dioxide
EV	: Electric Vehicle
MORP:	: Multi-Objective Route Planner
VRP	: Vehicle Routing Problem
ICT	: Information and Communications Technology
IVDRs	: In Vehicle Data Recorders
HMM	: Hidden Markov Models
RPM	: Revolutions Per Minute
OBDs	: Onboard Diagnostic Systems
HENS	: Heat Exchanger Network Synthesis
FCHEVs	: Fuel Cell Hybrid Electric Vehicles
EMSs	: Energy Management Systems
CCHP	: Combined Cooling, Heating and Power
ITS	: Intelligent Transportation Systems
V2V	: Vehicle to Vehicle
V2I	: Vehicle to Infrastructure

ABSTRACT

This study is based on the effect of telematics technology on efficiency and sustainability at Glovo Uganda. It is based on three main aspects, which include vehicle tracking technology, driver behavior monitoring technology, and fuel management technology. Data collection is done using 68 questionnaires distributed to the company's drivers and fleet managers.

The findings show that technology can be used to track vehicles and adjust the route in real time. As a result, the time taken to travel is reduced. Driver behavior, such as speeding is improved. Fuel management technology is used to reduce the environmental impact.

One thing to note is the way these technologies work together. Drivers know they are being monitored which means they drive differently. When the route is adjusted in real time, it means the entire process is improved. From the data collected, it is evident that the technology is working.

This research shows that telematics technology is useful in making fleets operate at a lower cost with less fuel. Glovo Uganda can improve its operations by purchasing quality telematics technology and training its drivers to use the technology. More research is still needed to understand the effect of the adoption of telematics technology on fleet performance and the environment.

CHAPTER ONE

1.0 Introduction

This chapter includes the background of the study on the impact of telematics in fleet efficiency and sustainability, highlighting the importance of telematics in fleet operations amid increasing transportation demands and environmental concerns. It is followed by a statement of the problem, which is focused on recognizing quantified effects of telematics in fleet efficiency and sustainability in actual operations. It is then followed by a set of objectives of the study, scope of the study, limitations and delimitation of the study, significance of the study and conceptual framework.

1.1 Background of the study

1.1.1 Historical Background

The history of the use of telematics can be traced back to the 1960s when the military began the development of the Global Positioning System also known as GPS, and the invention of the word "telematics" in 1978 to define the future role of computers and telecommunications in society. The development made in 1980s and 1990s, including the availability of the internet and public announcement of the GPS, contributed significantly to the public use of telematics for navigation and vehicle management. The launch of OnStar in 1996 was the major milestone in the advancement of the use of telematics in the integration of the system for the use of driver as well as for the purpose of offering assistance to the public, thus establishing its role as an important system for businesses as well as the public. As discussed by (Anwar Sohail 2025) as well as (Omid Ghaffarpasand 2022), they provide an extensive discussion on the role of vehicle telematics in reducing the mileage as well as the fuel consumption through the optimization of the route taken while driving, as well as the promotion of 'Eco driving" through the monitoring of the behavior of the driver for the purpose of achieving the best efficiency.

1.1.2 Theoretical Background

The theoretical framework of telematics is based on the integration of telecommunication and informatics concepts. This idea was first introduced by Simon Nora and Alien Minc in their 1978 report L'informatisation de la societe, where they stated that "the growing interweaving of computers and telecommunications which we will call 'telematics' will alter the entire nervous system of social organizations for it conveys not an inert current but information that is to say power." Telematics provides power to organizations by enabling rapid data transmission and processing for decision-making. The theoretical foundation of this concept focuses on the synergy between humans, technology and information. It is evident that apart from gathering information, the process can influence decision making and increase efficiency and sustainability. Telematics has come a long way since the use of automatic switches and teletype machines into advanced GPS-based tracking of vehicles. This is an illustration of the concept up forward by Nora and Minc.

1.1.3 Contextual Background

In Uganda, urbanization is occurring at a quick rate along with the development of e-commerce, which has led to a major increase in logistics delivery activities, as stated by United Nations Conference on Trade and Development (UNCTD) in 2021. In view of this, as there are many delivery firms including Glovo that operate in such vibrant urban environments, there is great scope for telematics technology to prove beneficial. Nevertheless, implementing telematics in urban logistics in Uganda comes with its own difficulties due to infrastructural restrictions as mentioned by Glovo in 2023.

1.1.4 Conceptual Background

Telematics in Fleet Operations Conceptual Background. The use of telematics in fleet operations is based on an improvement in the management of drivers and routes using real-time monitoring, GPS tracking, diagnostics and data analysis. For example. Bahiiga (2024) demonstrated the effectiveness of telematics in Glovo

Uganda, especially through applications such as Soter analytics platform, in increasing route efficiency, reducing operational costs, and improving sustainability in day-to-day delivery activities. Similarly, Filippini (2021) demonstrated the effectiveness of telematics in Glovo's last mile delivery model in Barcelona, where digital monitoring and data-driven logistics help achieve sustainability in services delivery hereafter, building upon these case studies, the research seeks to investigate the contribution of telematics data towards fleet operational efficiency at Glovo Uganda.

1.2 Statement of the Problem

It can be said that urban logistics in Uganda is in a difficult position because the adoption of telematics among fleet operations tends to result in inefficient and unsustainable practices that pose health and safety risks. This is evident since it leads to excess fuel consumption, high levels of emissions and unsafe driving conditions that fail to align with the objectives of creating an efficient, sustainable and safe system for managing fleets.

In the same vein, many fleet operators in Uganda including but not limited to Glovo Uganda face the challenge of proper fleet management in relation to telematics. The problem is that telematics implementation lacks sufficient data analysis, route optimization and monitoring of driver behaviors that can be associated with low efficiency, higher fuel consumption, unexpected maintenance expenses and unsustainable operations in the fleet industry.

There has been increased awareness from scholars about the significance of efficient telematics implementation regarding the improvement of fleet efficiency and sustainability. In line with this, it was shown by (Ghaffarpasand 2022) and (Victor 2025) that telematics can generate real-time data about the vehicle's performance, drivers and routing thus helping make better decisions. In addition, (Miler 2023) as well as (Szczesniak & Gorzelanczyk 2023) have mentioned that telematics plays an important role in improving sustainability in the environment while decreasing costs and enhancing safety. Moreover, (Lavanya Jacintha 2025) analyzed the transformative power of fleet telematics whereas (Omid & Sam Chapman 2025) explored several telematics issues related to urban transport such as road safety, emissions reduction and ITS. Last but not least, (Ryszard K. Miller 2023) and (Jakub & Piotr 2023) investigated the efficiency and cost effectiveness of telematics systems for fleet management.

Thus, all these scholars agree upon the significance of using telematics in order to enhance fleet management and reduce carbon footprints. Nonetheless, the need for future research should be recognized in terms of addressing telematics challenges in Uganda and other countries in Africa and Asia. The key aim of further research would be designing specific strategies that may help reduce carbon footprint in fleet operations and improve their performance.

Hence, the purpose of this study is to address the identified research gap by examining the effect of telematics on the efficiency and sustainability of fleet management in the operations of Glovo Uganda. More specifically, I will analyze how the utilization of telematics affects important affects important aspects such as route planning, fuel economy, sustainability, driver behavior and vehicle maintenance in order to make relevant suggestions for improving fleet management in the Ugandan logistics sector.

1.3 Study Purpose

The purpose of this research was to examine the possibility for transformation through telematics in improving fleet efficiency and sustainability with specific reference to Glovo Uganda's fleet operations. Through an analysis of the advantages, difficulties and possibilities that come from the integration of telematics, the research will particularly consider how the management of drivers, vehicle location, route optimization and fuel efficiency can be utilized to enhance fleet efficiency and minimize fuel use and environmental impacts.

1.4 Research Objective

- To examine how vehicle tracking influences route optimization at Glovo Uganda.
- To establish the impact of driver behavior monitoring on fuel efficiency within Glovo Uganda's fleet.

- To assess the ways in which fuel management systems reduce the environmental impact of Glovo Uganda on its delivery.

1.5 Research Questions

- What is the effect of vehicle tracking on route optimization in Glovo Uganda's fleet operations?
- What is the relationship between driver behavior monitoring and fuel efficiency in Glovo Uganda's fleet operations?
- To what extent do fuel management systems reduce the environmental impact of Glovo Uganda's delivery operations?

1.6 Hypotheses

- Vehicle tracking significantly improves route optimization in Glovo Uganda's fleet operations resulting in reduced travel times and increased delivery efficiency.
- There is a positive correlation between driver behavior monitoring and fuel efficiency in Glovo Uganda's fleet operations such that monitored drivers exhibit improved fuel efficiency compared to unmonitored drivers.
- Fuel management systems significantly reduce the environmental impact of Glovo Uganda's delivery operations by decreasing fuel consumption and greenhouse gas emissions.

1.7 Scope of the study

The scope of the study described the boundaries within which the research was to be conducted including geographical, time and content dimensions.

1.7.1 Geographical Scope

The study was conducted at Glovo Uganda headquarters in AHA Towers, Lourdel Road, Nakasero, Kampala Uganda.

1.7.2 Time Scope

"In this study focused on Glovo Uganda, the study aimed to explore the impact of telematics technology on fleet efficiency and sustainability from 2021 to 2025."

1.7.3 Content Scope

"The purpose of this research was to examine the impact of telematics on Glovo Uganda's fleet management, particularly in optimizing route planning, reducing fuel usage and promoting eco-friendly driving habits. By using real-time monitoring, fuel-saving strategies and optimized routing, the study aimed to identify best practices and challenges in implementing telematics solutions for fleet efficiency.

1.8 Justification of the Research

This paper took the environmental perspective into consideration in terms of reducing carbon emissions and sustainability using Telematics as an example. Because increased governmental dictates and environmental necessities for further eco-friendly operations are only getting more challenging, much is owed towards demonetizing telematics so as to ensure fleet monitoring strategies take the most positive contributions to effect. Its findings will help policy makers develop rules and incentives designed to increase the use of telematics for environmental purposes. Research about the impact of telematics in different types of fleets is not really very common. The extant research does not offer a holistic view of the promises and drawbacks associated with telematics (Mckinnon 2018 & Jensen 2017). In this paper, we seek to address how telematics has influenced fuel efficiency and the costs and optimization of routes provided have been quantified through methodical quantification to influence driver behavior.

1.9 Significance of the Study

This research on the impact of telematics in fleet efficiency and sustainability would hold a significant value for students, policymakers, institutions and organizations.

1.9.1 For students

Real world relevance: Engaging with this study would help provide students with practical insights into real world fleet management whereby it enhances their understanding of logistics, transportation and supply chain management. This therefore increased their employability in industries that utilize telematics systems and allowed them to apply theoretical knowledge in practical scenarios.

1.9.2 For Policymakers

Informed policy decisions: The findings from this study would automatically inform policy decisions by providing data driven insights that support evidence-based policy making. This therefore enabled the policymakers to develop targeted regulations and frameworks that promoted sustainable transportation, standardize data collection and ensured safety and security hence driving the adoption of telematics solutions that reduced emissions and improved fleet efficiency.

1.9.3 For Institutions

Promoted sustainability efforts: In this context, we observed that this research would assist institutions in minimizing their carbon footprint by optimizing their fleet performance, reducing fuel usage, and minimizing emissions. Such an effort promoted sustainability and enhanced corporate social responsibility, leading to sustainability in the long run.

1.9.4 For Organizations

Cost Savings: Another factor noted in this research is that cost savings are one of the most important aspects of telematics technology for businesses. Through telematics, savings can be achieved by minimizing fuel consumption, saving money on repairs because of the extended life of the vehicle and other means.

1.10 Limitations

- Narrow geographical area: This study only covered Glovo Uganda in urban, so the results might not be generalizable to rural.

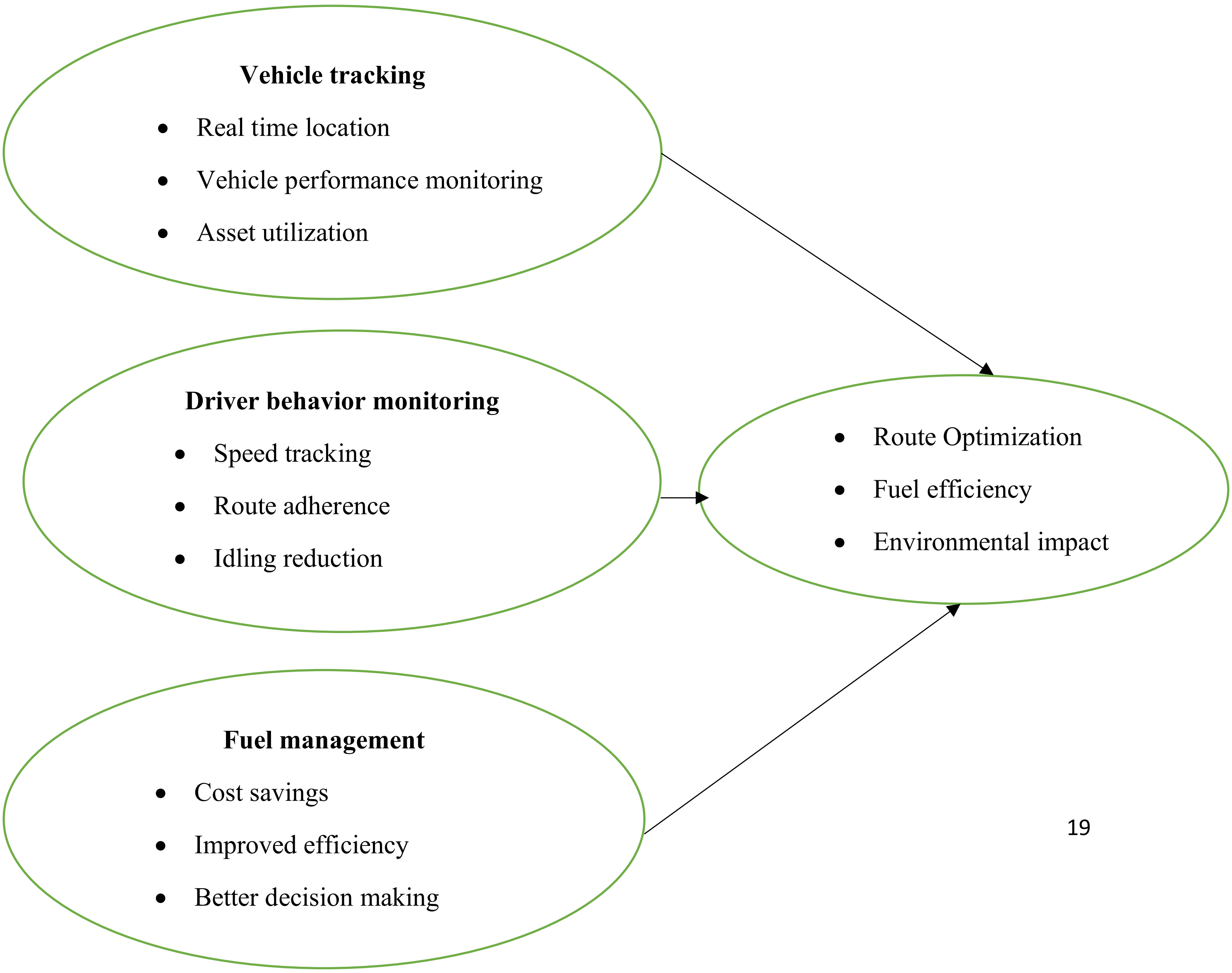
- Time constraints: The study only covered the period 2021-2025 excluding earlier or future adoption of the use of telematics.
- Technological variability: Differences in technological adoption limited the generalization of the findings.

1.11 Conceptual Framework

The conceptual framework illustrated the relationship between the impact of telematics in fleet efficiency and sustainability. Telematics directly influenced fleet efficiency and sustainability by providing real time GPS tracking for route optimization, monitoring vehicle performance and driver behavior enabling proactive maintenance scheduling which collectively reduce fuel consumption, lower emissions and minimize environmental impact.

Independent Variable (IV) Dependent Variable (DV)

Telematics **Efficiency and Sustainability**



1.12 Key Words

Telematics: An interdisciplinary field that combines telecommunications and informatics to track and monitor vehicles, assets or equipment using GPS technology, onboard diagnostics and wireless communication. Telematics further involves collecting and analyzing data on vehicle usage, driver behavior and other factors to improve fleet management, safety and efficiency (Gao & Meng 2022).

Vehicle Tracking: Refers to the use of GPS technology, event streaming platforms and other tools to monitor and manage the location, movement and status of vehicles in real time (Vitalii &Roman 2021).

Driver behavior/ Monitoring: The use of sensors and mobile devices such as smartphones to track and analyze driving patterns, identifying risky driving maneuvers and improving driver efficiency (Raphael & Thomas Engel 2015).

Fuel Management: The analysis and control of fuel cycles including irradiation and processing of fuel to estimate fuel costs and define operational requirements such as initial fuel compositions, refueling schedules and reactivity control (Pavel & Alan Waltar 2011).

Route Optimization: The process of finding the most efficient routing solution that meets specified requirements despite uncertainty in factors such as travel time or customer demand (Patrick Jaillet & Melvyn 2016).

Operational Efficiency: The ability of an organization to deliver products and services cost effectively without sacrificing quality achieving its goals with minimal resources (Andrew L Johnson & C. Lee 2012).

Description of environmental sustainability practices/ strategies: Involves assessing and enhancing the integrity of resources and ecosystems on which humanity depends. These practices include various assessment approaches such as design based and computational frameworks that aim to integrate environmental, economic and social elements (Erich T. Hester & Cayelan C. 2016).

Efficiency of the fleet: Refers to the optimal performance and utilization of a vehicle fleet minimizing waste and reducing environmental impact such as carbon dioxide emissions. But achieving fleet efficiency involves implementing policy measures that target various agents in the economy influencing the composition of the vehicle fleet (Svante Mandell 2009).

Logistics: Involves managing complex supply chains and networks requiring flexibility, adaptability and proactivity which can be achieved through the integration of new technologies such as those used in Smart Logistics (Dieter Uckelmann 2008).

Sustainability: It is critical in the context of transitioning away from fossil fuels and addressing the urgent need to mitigate climate change and ensure a post carbon world (Richard Heinberg & Daniel 2010)

CHAPTER TWO

Literature Review

2.0 Introduction

This chapter presents a comprehensive literature review that explores the application of telematics technology with a specific focus on Glovo Uganda. There are three main themes in this paper. The first explores how vehicle tracking contributes to route optimization. The second looks at the effects of monitoring driver behavior on fuel efficiency. The third is concerned with the role of fuel management systems in enhancing the environmental performance. By this review, based on the synthesis of existing literature, is a starting point to comprehending the possibility of the telematics technology in improving fleet operations.

2.1 Theoretical Review

Introduction of telematics technology in fleet management has revolutionized the manner firms are seeking efficiency and sustainability. By gathering real-time information on vehicle performance, driving practices and routes, telematics allows managers to make informed decisions. Vehicle decisions which minimize fuel usage, minimize emissions and enhance road safety. (Ghaffarpasand 2022). This indicates a larger trend of applying data-driven solutions in transport systems in order to achieve operational and environmental objectives.

Telematics has gained more and more popularity in recent years with an aim to increase the efficiency of fleets, minimize environmental impacts. An evaluation model of (Miller et al 2020) was created telematics of road transport enterprises (RTEs), demonstrating its ability to enhance fuel efficiency, maximize routing and improve the entire fleet. On the same note, (Sohail et al 2025) surveyed intelligent transportation systems vehicle telematics applications. ITS, with an accent on its contribution to eco-driving, eco-routing and observing driver behavior. Combined, these investigations are on the rise as a staple of sustainable fleet management.

Telematics is not merely only cost-effective but also enhances environmental performance. According to (Heinbach et al 2022), fright transport assets equipped with telematics have the capacity to support advanced services like the performance analytics, anomaly detection and risk assessment. Its contribution to enhancing road transport was also mentioned in (Kozerska and Smolnik 2024) management of the company especially via safety, efficiency and customer gains satisfaction. Also, (Wahlstrom et al 2017) indicated that telematics system on smartphones would revolutionize vehicle safety, traffic studies and insurance framework carrying the effects of telematics beyond fleet uses.

Nevertheless, the incorporation of telematics also has its issues. The identified (Sohail 2025) are barriers related to data processing, storage and privacy, while (Ghaffarpasand et al 2022) highlighted the necessity to conduct more studies on the use of urban mobility within urban areas in particular, promoting new technologies and new transport solutions. These challenges highlight the necessity to trade of between technological progress and data security and user trust.

Finally, telematics has turned out to a key element in the creation of efficiency and sustainability in fleet management. It delivers practical details on vehicle performance and driver behavior, aids in the minimization of fuel consumption, emissions and safety risks and continues to evolve. With the development of the telematics technology, its impact on the future of logistics and transportation will grow that will bring opportunities and challenges to the industry stakeholders.

2.2 Empirical Literature

2.2.1 Vehicle Tracking and Route Optimization

One of the key considerations that has led to the transformation of logistics and fleet management, particularly in route optimization, is the advancement of vehicle tracking technology. Through telematics, GPS IoT technology and RFID technology, accurate data collection is made possible, providing a basis for making informed decisions about vehicle locations, waste bin filling levels and traffic updates. This development allows businesses to switch from reactive strategies to proactive approaches in vehicle routing which promote effective utilization of resources as highlighted by (Akhtar, Hannan & Scavino 2017).

One of the most powerful uses of vehicle tracking technology lies in its capacity to eliminate unnecessary vehicle movement and optimize garbage collection. In this regard, by using smart bins that have sensors and are linked to the routing system, it becomes possible to track fill thresholds and schedule garbage collection when such thresholds are nearing. As per (Akhtar et al 2017), by using a backtracking search algorithm on capacitated vehicle routing problems (CVRPs) that incorporate smart bins, it is possible to reduce travel distance by 36.80%, while improving collection efficiency by 36.78% and cut CO_2 emissions by nearly 45%. This shows how tracking systems are changing waste collection from rigid, fixed schedules to more flexible approaches that respond to actual needs, allowing based on real-time conditions.

Vehicle tracking is also an important component in the process of dynamic clustering and heuristic-based optimization, especially in urban settings where waste and traffic patterns vary from one day to another. (Kapadia & Mehta 2023) presents an optimal routing model for vehicle tracking through smart bins, smart vehicles and cloud-based communication where we note that they have applied the Optimum A* algorithm to integrate multiple heuristics like road quality, traffic conditions, vehicle capacity and bin loads. In addition, they apply vehicle tracking data in determining these heuristics and thus ensuring continuous adaptation to optimize route decisions to minimize costs and reduce emissions.

Furthermore, tracking is instrumental in validating route data that could be used in future route optimization. For example, (Anghelache, Goga & Mitrea 2025) highlights the importance of machine learning algorithms for the purposes of validating route data to identify road hazards and inefficiencies. It can therefore be inferred that through leveraging GPS tracking data, their adaptive routing solution managed to lower travel distance by 19.6% and reduce total travel time by 14.2%. In essence, tracking provides important historical route information that strengthens future route decisions.

Vehicle tracking technology has applications beyond waste management, including logistics and retail distribution processes. For example, according to (Salheih, Shehadeh & Abushaikha 2021), is an attempt to understand the effects of vehicle tracking on fleet management, the researchers employed a field experiment design to evaluate the performance improvement attributable to IT integration in tracking and routing. As expected, their findings showed that through using IT tracking, managers would acquire measurable data useful in budgeting and technology selection.

It becomes apparent that the use of vehicle tracking technology also allows for better heuristic optimization methods because they will have access to more precise data from the real world. For instance (Yu et al 2021) were able to optimize the performance of a genetic algorithm for optimizing vehicle routes by incorporating tracking data from IoT technology and their findings suggested that the better the tracking data, the faster the algorithm would converge, leading to reduced distribution costs while increasing customer satisfaction.

The importance of tracking systems cannot be underestimated in transportation management in the context where scholars like (Jimoh, Ajao, Adeleke & Kolo 2020) developed the vehicle tracking system based on the use of GPS-based greedy forwarding algorithms aimed at improving efficiency of urban transportation systems in Nigeria. This tracking system offered accurate real-time location data, calculated distances and displayed time information with minimum errors. As a result, the amount of travel delay decreased which contributed positively to the development of fleet management schemes. Thus, this example shows hoe algorithmic approach combined with vehicle tracking system can offer practical benefits for transportation management.

In addition, tracking plays a vital role in the context of electric vehicles where multiple routing objectives are considered. For instance, (Sarker, Shen & Stankovic 2018) developed a Multi-Objective Route Planner (MORP) which integrates traffic prediction model with energy consumption estimates. Through use of real-time tracking information, they were able to predict velocity, travel times and charging needs, enabling EVs to have less anxiety about range while minimizing costs and considering environmental implications. Therefore, it shows that vehicle tracking is used not only to optimize the length of routes but to be a foundation for solving more complicated problems related to multiple objectives.

Continuous tracking is critical for any geo-positioning-based optimization system since (Belka & Godlewski 2021) found out that by increasing the frequency of updates of the distance matrix obtained through tracking and GPS data, VRP solution quality is enhanced. However, in their analysis, they state that the increase in number of updates can result in non-deterministic solution outcome. This finding shows that although updates of tracking data may lead to better results, it must be performed reliably and filtered to reduce uncertainty in VRPs.

Vehicle tracking combined with RFID can enable waste collection logistic systems to operate more efficiently. For instance, (Ustundag & Cevikcan 2008) created a logistic model that incorporated accurate RFID data concerning waste quality and its location. In this case, the integration of RFID data and vehicle tracking enabled optimization models to find the most cost-effective manpower routes for garbage collection.

Finally, the broader scientific literature highlights that vehicle tracking has been a cornerstone in the evolution of ICT-based vehicle route optimization whereby (Sood 2025) provides a scientometric analysis showing how ICT innovations especially tracking technologies have enabled research themes such as intelligent transportation systems, vehicular and hoc networks plus EV-based sustainable optimization. The study further identifies quantum computing and blockchain as emerging technologies that may further enhance tracking integration in future optimization hence this situates vehicle tracking as a foundational enabler in the larger digital transformation of logistics and transportation.

2.2.2 Driver Behavior Monitoring and Fuel Efficiency

Driver behavior monitoring has emerged as a critical determinant of fuel efficiency in modern transportation systems whereby research has consistently shown that even when vehicles and road conditions remain constant, individual driver choices and driver patterns significantly influence fuel consumption and sustainability outcomes. The integration of advanced technologies such as machine learning in vehicle data recorders (IVDRs) and real-time monitoring systems has provided researchers and fleet managers with new opportunities to assess and improve driver behavior ultimately contributing to fuel savings and environmental sustainability.

(Vyas, Das & Chaudhury 2021) developed a driver behavior and fuel-efficiency-based recommendation system (DriveBFR) that utilizes machine learning models particularly hidden Markov models (HMM) to predict driver actions and provide tailored feedback. This system employs a multi-objective optimization approach to enhance driver safety, reliability and fuel economy with an accuracy of 95% and the model demonstrates that algorithm-based driver monitoring can offer both predictive insights and corrective recommendations ultimately ensuring safer and more fuel-efficient journeys.

Similarly, (Werner n.d.) emphasized that driver behavior is often a more significant determinant of fuel efficiency than the mechanical efficiency of a vehicle itself whereby his analysis based on second-by-second naturalistic driving data revealed that gasoline consumption could be reduced by 17-26% if all drivers adopted the habits of the most fuel-efficient individuals. This highlights the potential to achieve significant efficiency gains through monitoring driver behavior and providing training, all without the need for major investments in new vehicle technology.

The application of in-vehicle data recorders has received ample attention with (Toledo & Shiftan 2016) showing that IVDR-based feedback can reduce both accidents and fuel consumption. Their research revealed that giving drivers constant written and oral feedback led to an 8 percent reduction in safety incidents and a 3-10 percent reduction in fuel consumption among the more than 350 drivers in the study.

(Meseguer, Calafate, Cano & Manzoni 2015) made their contribution to the issue by investigating instantaneous fuel consumption rates taking into account engine fuel flows, speed and air flow. This approach showed that monitoring in real time could enable drivers to notice their bad driving and correct it. Furthermore, one may observe that the research of (Meseguer et al 2015) has proved that fast acceleration and improper local management cause excessive fuel consumption and emissions of greenhouse gases while correction promotes eco-driving.

Positive effects of real-time feedback may also be seen in case of public transportation systems (Rolim, Baptista, Duarte, Farias & Pereira 2017). The authors investigated the driving behavior of bus drivers in Lisbon who were monitored continuously or not. It has been revealed that those bus drivers whose behavior was being monitored did noy practice such undesirable actions as sharp braking, high RPMs and fast start-ups as compared to other drivers. The absence of real-time monitoring caused increased fuel consumption up to 3,769 liters while real-time feedback resulted in saving up to 2% of fuel.

The research by (Wijayasekara, Manic & Gertam 2015) was centered on monitoring vehicle fleets with the help of a cheap plug-and-play feedback mechanism. The method used historical data on drivers and constructed optimal peed profiles that were shown to the driver. Tests on the bus fleet from Idaho National Laboratory have shown up to 9-20% savings of fuel.

According to (Fafoutellis, Mantouka & Vlahogianni 2020) eco-driving can be explained as a multilayered construct that includes not only individual driving actions but also decision-making processes that range from selecting one's route to choosing fuel type. Their review highlighted that behavioral monitoring technologies such as mobile apps and onboard diagnostics (OBDs) are crucial for implementing eco-driving practices. They concluded that while vehicle improvements are important, behavioral changes remain among the most eco-effective strategies.

Further support comes from (Walnum & Simonsen 2015) whose study analyzed fuel consumption in heavy-duty trucks in Norway through data collected from an online fleet management system. It turns out that while the infrastructure and the vehicle itself were important determinants of fuel consumption in difficult terrain, driver behavior still played a critical role in the process. This means that it is possible to monitor driver's behavior and use such information for the purpose of optimizing vehicle allocation and training programs in pursuit of economic and environmentally-related goals.

It is also possible to use machine learning techniques for predicting relationships between fuel consumption patterns and driver's behavior. For example (Ping, Qin, Xu & Takeda 2019) developed a deep learning model capable of classifying and predicting fuel consumption related to different types of driving behavior, as it uses naturalistic driving data together with environmental factors. Thus, the method allows for analysis of both macro-and micro-levels of driving, which makes it possible to integrate into driver assistance systems that promote environmentally friendly behavior.

Another method proposed by (Wickramanayake, Bandara & Samarasekara 2020) involves the integration of random forest classification with fuzzy logic feedback system for the purpose of monitoring driver's fuel-inefficient behaviors and making corrections on the spot. In an experiment, the methos turned out to be a quite effective since when applied to a long-distance bus dataset, its success rate reached 85.2%, resulting in up to 16.4% improvement in fuel efficiency.

Overall, all these studies clearly demonstrate that there is a lot of potential to monitor and modify driver's behavior in terms of fuel consumption and use this knowledge in pursuit of sustainability. Although developments in vehicle design and fuel consumption technologies continue, immediate benefits offered by monitoring and modifying driver's behavior appear to be quite considerable and valuable in the context of today's problems associated with transportation sector.

2.2.3 Fuel Management Systems and Environmental Performance

Moreover, fuel management systems and energy optimization approaches are vital in enhancing fuel efficiency, minimizing greenhouse gases, air pollution and reliance on fuel. The current research demonstrates numerous strategies that could help achieve this objective by introducing new technologies, operational strategies and changes in behavior patterns. There is no doubt that efficient fuel management systems are capable of addressing all these issues and contributing to the overall environmental sustainability.

For instance, (Brynolf, Baldi & Johnson 2016) paid attention to the fact that there are multiple approaches to reducing environmental impact of shipping industry. In particular, they stated that technical design elements such as the usage of hull coatings, improvement of propulsion and waste heat recovery could increase the efficiency of energy conversion. In addition, weather routing and optimized scheduling are the factors that contribute to decreased emissions. It is important to note that choice of fuel may play an integral role in achieving this purpose as there are alternative sources of power such as gas and alcohol-based fuel.

With regard to industrial energy systems, (Gabr & Mohamed 2020) developed network synthesis (HEN) and insulation. Thus, they were able to obtain reductions in fuel use and emissions up to 70%. However, when using natural gas as a fuel source, these numbers rose to 85% as there was reduction in operating cost. Hence, combination of HEN design and insulation together with fuel switching is a good way of improving system performance from both economic and ecological perspectives.

Among the automobile industry solutions, Fuel Cell Hybrid Electric Vehicles (FCHEV) are increasingly viewed favorably. According to the review article by (Sulaiman et al 2018), energy management systems (EMSs) for fuel cell hybrid electric vehicles play a significant role in minimizing the use of fossil fuels. In their article, (Sulaiman et al 2018) discuss optimization techniques for energy management systems such as dynamic programming, genetic algorithm, and fuzzy logic among others that are applied for increasing battery efficiency and distributing power efficiently. Through this article, the significance of optimization of energy management systems is emphasized by providing that zero emissions can be achieved.

The approaches for optimizing systems have proven themselves highly effective. For example (Li et al 2020) offered an integrated CCHP model featuring photovoltaic generation and battery storage. Utilizing a chaos mutation whale optimization algorithm, the researchers achieved remarkable results, reducing energy consumption and carbon emissions by 35.75% and 39.84% respectively. Additionally, they were able to save on primary energy resources by 35.75% and reduced fuel costs by 62.07%. Thus, this case study confirms the potential of optimization algorithms.

Another approach to optimizing fuel consumption was proposed by (Ali et al 2012). Specifically, they performed a series of experiments to demonstrate how fuel magnetization could affect the combustion efficiency of vehicles. It turned out that this approach allowed to reduce emissions of both hydrocarbons and carbon monoxide by 70% and educe the consumption of fuel by 18%. Overall, this is a promising solution that will help to improve energy consumption in cars.

Finally, another way to analyze the efficiency of fuel systems is exergy analysis. (Rosen et al 2008) argued that exergy analysis was a more accurate measure for determining inefficiency and negative impact on the environment than ordinary energy analysis. Specifically, they suggested using a sustainability index related to energy efficiency. This would help identify all thermodynamic losses in energy systems and make necessary improvements.

According to (Romero et al 2024), in reviewing the automotive fuel management methods, there is a need to consider the significance of increasing energy security while at the same time reducing any negative impacts on the environment. This literature review looked into not only the direct but also the indirect factors involved in fuel consumption and pointed out that there is a constant need for updating energy efficiency methodologies.

(Shaheen & Lipman 2007) expanded the discussion to include surface transportation systems identifying fuel management as a key component in reducing greenhouse gas emissions. Moreover, they stressed the significance of employing intelligent transport systems (ITS) and other means of mobility management such as road pricing, carsharing and telecommuting, to minimize fuel consumption. Consequently, the researcher’s results revealed that while technological improvements in vehicle systems are essential, broader measures based on ITS and other policies can help increase the contribution to the environment made by fuel management solutions.

(Bagloo, Rahmani & Gholamnejad 2024) proved that monitoring and dispatching systems could contribute to the decrease in fuel consumption rates during mining activities. They found that their implementation resulted in a 9.7% decrease in fuel consumption and decreased annual in fuel consumption of CO2 by about 3 million kilograms. Specifically, their work shows the possibility of reducing the consumption of fuel by implementing several practices: in-pit crushing, conveyors and the exploration of alternative fuel types such as hydrogen.

Another example provided by (Ma 2013) is related to the analysis of intelligent fleet management systems that combine V2V and V2I communication technologies. In particular, he was interested in investigating the ways of improving fuel efficiency and minimizing emission rates among fleets of heavy vehicles through the optimization of speed trajectories. Discrete dynamic programming has shown that the implementation of adaptive speed control during platooning strategies could significantly increase fuel efficiency and reduce greenhouse gas emissions.

Thus, this section has shown that fuel management systems can be applied effectively in a variety of industries to decrease the environmental impact. Whether the industry includes shipping services, manufacturing, automotive sector, mining activities or some other operations, the implementation of innovative technologies including optimization algorithms and information and communication technology (ICT), is proven to yield significant positive results.

2.3 Literature Gap

Even though the number of publications about the use of telematics in transportation management continues growing, some significant gaps can be identified regarding the effects of the technology in the context of improving the efficiency and sustainability of fleets in Uganda. First of all, most of the existing studies consider general issues related to transport digitalization, while providing little information about the effect of using vehicle tracking on routing optimization. Moreover, thy do not pay much attention to the importance of the driver behavior monitoring when it comes to the improvement of fuel efficiency or to the role of fuel management systems in reducing negative environmental impact. Finally, there are no empirical studies conducted in different industries like public service and logistics assessing the efficiency and sustainability of telematics technologies.

2.4 Summary of the Literature Review

In this chapter, the author provided a review of the current state of telematics theories used in the context of fleet management and discussed empirical researches associated with fleet efficiency and sustainability. This chapter was structured around three major topics: vehicle tracking and route optimization; fuel management systems and reduction of environmental impact. The review demonstrated that telematics technologies contribute greatly to operational efficiency, as well as lowering the level of negative environmental impact by reducing fuel usage. Nevertheless, there are some gaps in this area. Thus, this chapter paves the way for the following empirical research.

CHAPTER THREE

Research Methodology

3.0 Introduction

This chapter describes the research methodology employed in the evaluation of telematics technologies in terms of their effects on operational and environmental performance of fleets. The methodology will comprise a complete outline of various aspects related to the research process including, but not limited to the following: research design, study area, target population, sample selection procedures, data collection methods and data analysis. In this way, the research is expected to be efficient in determining how the application of telematics technologies affects the performance of fleets in the context under investigation.

3.1 Research Design

The proposed research employed a mixed-methods research design which is a structured strategy in the combination of different research methodologies for the purpose of obtaining objective, reliable and generalizable findings. In line with (Anderson & Dannels 2018), research design is a tool that determines all of the decisions made throughout the entire research process, starting from participant's selection and ending with data gathering and analysis methods. In this regard, the present study used a descriptive cross-sectional research design in order to explore the ways in which vehicle tracking, driver behavior monitoring and fuel management systems can affect the performance of fleet in question.

3.2 Study Area

The research was carried out at the headquarters of the Glovo Uganda company that are situated in AHA Towers, Lourdel Road, Nakasero, Kampala. The selected company owns a rapidly growing fleet of on-demand delivery and logistics vehicles, which operates across urban and peri-urban areas. At this point, it should be highlighted that the headquarters represent the center where various operations such as fleet coordination, rider support and monitoring of digital systems (such as vehicle tracking, driver behavior monitoring and fuel management) are performed.

3.3 Study Population

The population for this study was made up of about 100 people comprising of fleet managers, riders and operational personnel responsible for managing operations and interactions with telematics technology. As (Shah 2023) explained, selecting the right population is crucial to ensuring that one selects the right participants to provide information to answer a particular research problem. Accordingly, in this case the population chosen is that of people who are more aware of the effects of telematics in terms of fleet operations at Glovo Uganda thus the selected population is the one relevant for generating data given their inclusion in the sampling frame.

3.4 Sampling Design

Stratified sampling technique was adopted for the purpose of selecting the right sample from among the study population that best captures different operational aspects at Glovo Uganda. Following the recommendation of (Lohr's 2021) to develop survey sample designs that are effective in terms of enhancing representativeness and reducing variability, the stratification process would be used to develop subgroups from among the selected population that have common characteristics related to telematics usage such as vehicle tracking, driver behavior monitoring and fuel management. Thus, the subgroups created will include fleet managers, drivers and operations personnel who constitute different strata for collecting the data necessary to answer the questions posed. Within each stratum, simple random sampling procedure will be applied to increase representativeness and minimize selection bias.

Sample size determination was done through proportionate stratified sampling using the (Krejcie and Morgan 1970) recommended sample sizes for each subgroup within the study population. The following table shows how the study population will be distributed according to strata and their respective sample sizes.

Table 1

Stratum	Population Size	Sample size (n)
Fleet Managers	20	16

Drivers	50	40
Operations Staff	30	24
Total	100	80

The method guarantees that the research results are genuine and unchanged, thus depicting the genuine opinions and procedures of the fleet management department of Glovo Uganda.

3.5 Data Collection

3.5.1 Sources of Data Collection

The data needed for the study was sourced from both primary and secondary sources to ensure that there is a comprehensive grasp of the research problem. The secondary data came from a variety of reliable sources such as industry reports, scholarly articles, organizational documents and government publications. All these sources provided essential background information on the current trends within the field, providing a solid context for the study. Alongside these sources, primary data was sourced from respondents through the use of surveys, interviews and observations which enabled me to obtain firs-hand data and verify information found from secondary sources.

3.5.2 Data Collection Techniques and Instruments

Questionnaires: Structured questionnaires were developed to gather quantitative and qualitative data on the impact of telematics technology following an approach similar to that described by (Cerniglia 2020). In this study questionnaires were designed as systematic instruments intended to capture respondent's subjective perceptions and experiences related to a specific phenomenon ensuring that both measurable and descriptive insights are obtained. Accordingly, the questionnaire for this research would include a combination of closed-ended questions which offered quantifiable and comparable data, and open-ended questions which allow respondents to express deeper insights, attitudes and personal experiences thereby enriching the dataset and supporting a more comprehensive analysis of telematics applications.

In-depth Interviews: Qualitative data was obtained through in-depth interviews with fleet managers and logistics coordinators aligning with the understanding of interviews as structured yet flexible technique for gathering rich empirical insights (Della Porta 2014). In-depth interviews as described in social science research allowed researchers to collect reflective and detailed accounts by guiding participants through focused themes relevant to the study while maintaining a conversational style that encourages openness and depth (Weiss 1994, Holstein & Gubrium 2002). The interviews to follow will address participants' personal experience with telematics technology and its effects on efficiency and sustainability.

Observation: Another aspect to be considered for this research was the direct observation of the fleet management processes and the use of telematics technology based on the knowledge of the process of observation as a scientific and systematically structured way of data gathering (Farid 2022). Observation, once for achieving a set of research purposes, allows the researcher to get real-life insights into the use of telematics systems and the impact of this application on operations and their outcomes. This way, the researcher obtains information about behaviors and practices in areal-world setting which are unlikely to be captured by questionnaires and interviews. While observation might be subjective, its scientific approach improves the reliability of the gathered data.

In conclusion, quantitative and qualitative methods were utilized to analyze data. The quantitative data obtained from the questionnaire would be processed statistically to uncover possible trends and patterns. On the contrary, qualitative data obtained from the interview and observations would be used to derive themes from the analysis of these data sources. The integration of quantitative and qualitative data allowed obtaining more accurate and multidimensional insights into the research problem and reaching valid conclusions.

3.6 Data Collection Procedures

The data was collected over a span of three to four weeks, and as far the quantitative aspect is concerned, the participants would be asked to fill up a questionnaire. The questionnaires were be distributed via email as well as by physically delivering them to the participants.

3.7 Data Management Analysis

It should be noted that this study used a proportionate stratified sampling technique where the sample size was determined based on the widely applied sample size recommendations of (Krejcie & Morgan 1997). In fact. The total population consisted of 100 personnel comprising three separate strata that were 20 fleet managers, 50 drivers and 30 operations staff members. As a result, using the formula for proportionate allocation, the sample will be divided proportionally to reflect the shares of each of the strata among the total population, resulting in the sample of 80 people including 16 fleet managers (20% of 80), 40 drivers (50% of 80) and 24 operations staff members (30% of 80). Consequently, it can be argued that this procedure will make sure that the chosen sample is not only proportioned to the population but meets the table of (Krejcie & Morgan 1997) as well in terms of 95% confidence level and 5% margin of error.

3.8 Validity and Reliability

3.8.1 Validity

As can be seen, the validity of this study was based on the thorough methodology of the research itself. In particular, the survey tools were characterized by high content validity due to the reliance on existing research on telematics, fleet efficiency and sustainability as the constructs that should be measured. In regard to the external validity of the study, it is ensured by application of (Krejcie & Morgan 1097) sample framework that helped determine the sample size of 80 that includes 16 fleet managers, 40 drivers and 24 operations staff members. Besides, the application of stratified sampling technique makes sure that the interests of all stakeholders involved in the process are equally represented. Furthermore, the measures of fleet efficiency and sustainability based on the selected telematics factors are characterized by construct validity.

3.8.2 Reliability

The reliability of the study was assured by using a solid methodology for the purpose of this study. High internal consistency was found in the survey, as indicated by a Cronbach's alpha value of 0.85. This helps assure that the effect of telematics on fleet management is evaluated with precision. The other aspect contributing to the reliability of the study is the use of well-formulated questionnaire items that have been developed from previous studies. The application of stratified sampling, which resulted in a sample size of 80 respondents, has increased reliability too. Further, the reliability of the study is enhanced through the provision of detailed information concerning all phases of the research process.

3.9 Ethical Considerations

Ethical considerations were strictly followed in this study for the protection of participants' rights. Prior to commencing the study, consent forms will be given to the respondents to explain the purpose and nature of the study and to inform them about their rights regarding participation. The study will completely be voluntary and each participant will be given a consent form stating their right to withdraw from the study without any negative consequences. In order to maintain the privacy of the respondents, their identities will remain anonymous in the entire research process. Personal identifiers will be eliminated to assure complete anonymity and there is no way to trace participants' responses. Participants will be informed during the process of research about confidentiality of the study, which means that all data collected will be kept private and used only for the intended purpose.

CHAPTER FOUR

Data Analysis, Interpretation and Presentation

4.0 Introduction

This chapter provides an analysis of the findings collected in the field. The research is aimed at investigating the influence of telematics technology on fleet management aspects in Glovo Uganda. In order to obtain data for the research, both quantitative and qualitative, a questionnaire was developed, which was used to gather data from drivers, fleet managers and other relevant staff members of the company.

4.1 Response Rate

Table 2: Response Rate for Questionnaires

Response Rate	Frequency	Percentage (%)
Received	68	85
No Response	12	15
Expected Response	80	100

Source: Primary data 2026

According to Table 2, the total number of questionnaires sent to the intended respondents at Glovo Uganda is 80. However, only 68 questionnaires were successfully answered and submitted while 12 were not submitted. This represents a response rate of approximately 85% which is considered high and suggests a strong level of interest and engagement among the respondents in the study.

4.2 Demographic Information

The demographic information collected in this study provides background characteristics of the respondents including their roles within fleet management, years of experience with telematics technology and other relevant attributes.

4.2.1 Role in Fleet Management

Table 3: Role of Respondents in Fleet Management

Role	Frequency	Percentage (%)	Cumulative (%)
Fleet Manager	8	11.8	11.8
Driver	50	73.5	85.3
Operations Staff	7	10.3	95.6
Other	3	4.4	100
Total	68	100	

Source: Primary data 2026

The above table indicates that the operational emphasis of Glovo Uganda is further evidenced by the participant composition with drivers comprising the majority of respondents 73.5%. Fleet managers accounted for 11.8% of the sample while operations personnel represented 10.3% indicating that the study also acknowledged the critical role of managerial and support functions in the implementation of telematics systems.

4.2.2 Years of Experience with Telematics Technology

Table 4: Years of Experience with Telematics Technology

Years of Experience	Frequency	Percentage (%)	Cumulative (%)
Less than 1 year	13	19.1	19.1
1-3 years	35	51.5	70.6
4-6 years	12	17.6	88.2
More than 6 years	8	11,8	100
Total	68	100	

Source: Primary data 2026

The table above shows that most respondents had limited to moderate experience with 51.5% reporting 1-3 ears and 19.1% less than 1 year of experience together accounting for 70.6% of the sample. Those with 4-6 years of experience comprised 17.6% while respondents with more than 6 years represented 11.8% indicating a smaller proportion of highly experienced participants.

4.3 Vehicle Tracking and Route Optimization

4.3.1 Effectiveness of Telematics in Tracking Vehicle Location

Table 5: Effectiveness of Telematics in Vehicle Tracking

Effectiveness	Frequency	Percentage (%)
Effective	62	91.2
Not Effective	6	8.8
Total	68	100

Source: Primary data 2026

Based on the outcomes above, it can be noted that the majority (91.2%) of respondents viewed telematics as a viable means through which they could monitor their vehicles and hence ensure real-time visibility of their fleets. It is quite crucial in improving efficiency as well as ensuring fast response. On the other hand, those respondents who disagreed account for 8.8%.

4.3.2 Improvement in Route Optimization

Table 6: Improvement in Route Optimization

Statement	Frequency	Percentage (%)
Improved	55	80.9
Not Improved	13	19.1
Total	68	100

Source: Primary data 2026

Overall, 80.9% of respondents claimed that there has been an improvement in route optimization due to telematics technology. However, 19.1% of respondents were dissatisfied with the system and mentioned that poor maps and low update rates of information were key constraints for their dissatisfaction. In order to improve the performance of telematics systems, it is suggested that traffic information be included into the system.

4.3.3 Difficulties Encountered with Telematics in Routing

Table 7: Difficulties Encountered with Telematics in Routing

Encounter Issues	Frequency	Percentage

Rarely	42	61.8
Frequently	26	38.2
Total	68	100

Source: Primary data 2026

The challenges faced were losing signals while using GPS at isolated locations, as well as errors in determining the location, which were faced by 38.2% of respondents frequently. In order to improve the accuracy of routes generated, recommendations were made to make GPS systems more efficient so that data could be integrated easily.

Qualitative Insights

Among the many successes that were mentioned was the capability of telematics to make operations more efficient through re-routing. Unfortunately, system problems and GPS concerns have been consistently problematic for companies implementing telematics.

4.4 Driver Behavior Monitoring and Fuel Efficiency

4.4.1 Impact of Telematics on Driving Safety

Table 8: Impact on Driving Safety

Safety Improvement	Frequency	Percentage (%)
Improved	48	70.6
Not Improved	20	29.4
Total	68	100

Source: Primary data 2026

It has been observed that the use of telematics technology to monitor driver behavior leads to increased driving safety by 70.6%, with the largest impacts being seen in cases where harsh braking and speeding occur. The continuous monitoring system acts as a discouragement for engaging in risky driving practices, which adds to the overall safety of the fleet. It should be noted that monitoring driver behavior should not induce undue stress.

4.4.2 Influence on Fuel Efficiency

Table 9: Influence on Fuel Efficiency

Statement	Frequency	Percentage (%)
Improved	54	79.4
Not Improved	14	20.6
Total	68	100

Source: Primary data 2026

It was found that telematics would help improve fuel economy in 79.4% of cases mainly due to better routing and driving changes aimed at eliminating unnecessary fuel wastage. The advantages listed by the respondents included less idle time and smooth acceleration. Moreover, predictive maintenance was mentioned by some respondents as another factor that could help save fuel.

Qualitative Insights

Driver behavior tracking by means of telematics has proven to encourage safe driving and enhance fuel efficiency as well. Nevertheless, there were some participants who believed that driver surveillance could lead to an increase in driver stress levels and thus required adequate countermeasures.

4.5 Fuel Management Systems and Environmental Impact

4.5.1 Effectiveness of Fuel Management Systems

Table 10: Impact on Fuel Management Systems

Effectiveness	Frequency	Percentage (%)
Positive Impact	58	85.3
No Impact	10	14.7
Total	68	100

Source: Primary data 2026

In all, 85.3% of survey participants confirmed that the use of telematics has proved advantageous for fuel management. It should be stressed that telematics can be considered an important instrument for fuel control, detection of fuel wastage and thus, fuel improvement. It can be predicted that the implementation of telematics in fuel management will result in cost-savings and environmental benefits as well.

4.5.2 Contribution to Environmental Impact Reduction

Table 11: Environmental Impact Reduction

Statement	Frequency	Percentage (%)
Contributed	59	86.8
No Contribution	9	13.2
Total	68	100

Source: Primary data 2026

According to the survey, 86.8% of the respondents felt that the technology of telematics has been instrumental in reducing the negative effect on the environment due to improved routing to prevent unnecessary fuel wastage. Nonetheless, some of the interviewees felt that it would be necessary to integrate green cars into the fleet in order to capitalize on the environmental advantages of telematics.

Qualitative Insights

The use of telematics helps to promote emissions reduction and environmentally conscious driving behavior. Nonetheless, the use of old vehicles emerges as one of the greatest obstacles to attaining the ecological advantages of telematics.

4.6 Additional Feedback

4.6.1 Difficulties Encountered with Telematics

Table 12: Challenges faced with Telematics

Challenges	Frequency	Percentage
Faced challenges	44	64.7
No challenges	24	35.3
Total	68	100

Source: Primary data 2026

Of all the respondents, 64.7% had problems concerning telematics technology when it came to issues surrounding connectivity and data integrity. These difficulties highlight the necessity of providing technical assistance and making improvements to the telematics system itself to increase its efficiency.

4.6.2 Suggestions for Improvement

Table 13: Suggested Improvements

Improvement Suggestion	Frequency	Percentage
Suggested Improvements	48	70.6
No Suggestions	20	29.4
Total	68	100

Source: Primary data 2026

The participants indicated various suggestions for system improvement, among which the following stood out: more regular system updates, grater compatibility with other fleet management systems and thorough user training. An additional recommendation was for the establishment of feedback systems and system improvements that were to be ongoing.

4.7 Overall Findings

On balance, it appears that significant progress has been achieved in the field of fleet management at Glovo Uganda, including such areas as vehicle tracking and optimization of routes, analysis of driver behavior, and vehicle fuel consumption. In particular, the implementation of telematics systems has helped significantly increase efficiency and controllability. However, there exist a number of problems associated with the reliability and usability of these technologies as well as their interconnection with other information systems. To solve this problem, it is necessary to take several steps aimed at increasing the efficiency of the telematics system.

Moreover, this paper provides for a combination of quantitative indicators with qualitative analysis accompanied by illustrations, providing a comprehensive assessment of the impact of telematics on fleet management. Thus, the presented findings clearly indicate the importance of telematics systems in relation to operational efficiency, safety and sustainability of the management process. All things considered; these outcomes testify to the relevance of telematics as a modern technology of fleet management.

4.8 Conclusion

This study concludes that fleet management at Glovo Uganda has improved through telematics technology, which has enhanced route planning, vehicle tracking, driver performance monitoring, fuel efficiency and overall operational effectiveness. Additionally, the technology has contributed to better road safety, cost management and reduced environmental impact by lowering fuel use and emissions. However, challenges remain, including reliability, data accuracy, connectivity issues, integration difficulties and driver stress. Addressing these through system upgrades, stronger GPS functionality, smoother software integration, continuous staff training and effective driver management is essential. Overall, the research confirms that telematics is a vital tool for boosting efficiency, safety and sustainability in fleet management at Glovo Uganda.

CHAPTER FIVE

Discussion, Conclusion and Recommendations

5.0 Introduction

This chapter presents the analysis, conclusions, and recommendations drawn from the study on the impact of telematics technology on fleet efficiency and sustainability at Glovo Uganda. It interprets the findings from chapter four in the context of the literature review from chapter two and offers practical recommendations based on the results. Besides, it discusses the limitations of the research and suggests future research directions.

5.1 Discussion of Findings

5.1.1 Vehicle Tracking and Route Optimization

According to the results of the survey, the majority of respondents consider telematics technology as a useful instrument for real-time monitoring of vehicle positions. Namely, 91.2% of participants believe that the use of telematics systems improves vehicle tracking efficiency while 8.8% argue that the technology does not work effectively in this regard. A large number of affirmative responses suggests that telematics users have great faith in the ability of the technology to ensure efficient monitoring and management of fleet operations. Real-time tracking makes it possible for fleet managers to monitor their vehicles' positions regularly and act promptly when necessary to solve emerging problems.

Moreover, 80.9% of respondents said that telematics helps improve route optimization while the remaining 19.1% do not agree that route optimization has significantly improved due to using the technology. In accordance with the received information, telematics technologies positively influence the process of route optimization by improving navigation capabilities and optimizing fleet resource allocation. Better route optimization helps save time, reduce fuel expenses, and minimize operational costs contributing to the improvement of fleet management performance. Meanwhile, those respondents who did not mention any positive changes explained their opinions by the presence of outdated mapping information and insufficient frequency of map updates.

Some problems associated with the use of telematics technologies have been revealed. So, 38.2% of respondents stated that they regularly suffer from GPS signal losses in remote regions and inaccuracy of location information. Such technical challenges impact negatively the accuracy of route planning as well as time tracking of vehicle positions, reducing efficiency of fleet management. Frequent disruptions in GPS signal led to the impossibility of establishing stable connection between vehicles and monitoring systems thus making fleet management less effective. Inaccurate vehicle location information may cause wrong decisions on routing vehicles.

In order to improve performance of the technology, respondents advised improving robustness of GPS network, integration among system parts and performing regular software updates. Moreover, they recommended including up-to-date traffic information in the software and introducing predictive analysis to increase flexibility of route adjustments. From a qualitative point of view, some respondents stressed that telematics help reroute vehicles during the travel and optimize operational procedures. At the same time, frequent GPS disruptions remain the most acute problem which requires permanent solving.

5.1.2 Driver Behavior Monitoring and Fuel Efficiency

The respondents revealed that the implementation of telematics technology has been instrumental in improving driving safety. Indeed, 70.6% of the respondents stated that there had been some improvement in driving safety, mainly as a result of monitoring the driver's behavior. On the other hand, 29.4% of the respondents said that there has been no significant change in driving safety following the introduction of the technology. It appears from the results that telematics technology is essential in increasing fleet safety, mainly due to the continuous monitoring of the driver's performance. Most importantly, telematics has shown the greatest improvement in cases of harsh braking and speeding, which may lead to road accidents and excessive wear and tear of vehicles. The continued monitoring of the driver's performance works as a motivator to ensure that the driver adheres to the prescribed driving standards. It seems clear that the percentage of the respondents who did not see any improvement calls for some supplementary measures to maximize the improvement.

Additionally, telematics technology has helped to improve fuel efficiency. Indeed, 79.4% of the respondents reported an improvement in fuel efficiency after adopting the technology. However, 20.6% of the respondents felt that there had been no significant change in fuel efficiency after introducing telematics. According to the respondents, the improvement in fuel efficiency was mainly due to proper routing and improved driving habits such as reduced idling, smooth acceleration and the elimination of aggressive driving.

It is clear that the benefits of telematics technology extend driving safety. As such, some suggestions were made by some respondents for adding predictive maintenance into the telematics system to help save on fuel costs. Predictive maintenance allows early detection of mechanical problems, thus minimizing wastage of fuel due to poorly performing mechanical components. It is important to include predictive maintenance in the telematics to enhance the system's impact.

Qualitatively, the respondents stated that monitoring driver behavior encouraged safe driving and improved fuel economy. However, some participants raised concerns that the continued monitoring of driving may put pressure on the drivers and create psychological distress among them. As a result, telematics should be implemented cautiously with emphasis on monitoring and driver encouragement and positive feedback.

5.1.3 Fuel Management Systems and Environmental Impact

From the results, it is evident that the introduction of telematics technology has greatly benefited fuel management systems. According to the table 10, 85.3% of the respondents said that the use of telematics had positively impacted fuel management systems. In contrast, 14.7% of the respondents did not see any impact on fuel management systems from the use of telematics. The high percentage of people that saw positive impacts on fuel management shows that telematics is a great monitoring device used by fleet managers to monitor fuel use. It helps in the identification of fuel consumption issues and implementation of corrective measures.

The positive impact of telematics on fuel management also has an effect on sustainability. By minimizing fuel consumption, organizations can save money and reduce greenhouse emissions. Effective fuel monitoring can help organizations perform well financially and make sure they are complying with environmental sustainability objectives. Nevertheless, the results show that there is 14.7% of people that do not believe that there is any impact on fuel management. This is because the efficiency of the telematics technology varies according to how the system is implemented, the level of user involvement and the state of the fleet.

The survey results indicate that telematics has made a great contribution to environmental impact reduction. According to the findings, 86.8% of the respondents said that telematics technology had made a contribution in reducing the environmental impact of their operations. Conversely, 13.2% of the respondents did not see any contribution that telematics technology has made in minimizing environmental impact. The contribution that telematics technology has made to environmental impact is due to the fact that telematics systems optimize routes and minimize fuel wastage and time wastage.

Although telematics technology has made several contributions, some of the respondents argued that in order to make full contributions to environmental sustainability, other measures have to be put in place. According to some respondents, since there is heavy use of older fleets in the organization, there is minimal contribution made towards environmental impact minimization. Since old fleets consume more fuel compared to new environmentally friendly vehicles, telematics cannot help in environmental impact minimization completely.

Apart from these quantitative results, qualitative results also revealed that telematics encourages drivers to use emission-friendly methods of driving. Telematics makes it possible for organizations to continuously monitor driver behavior and enforce policies that discourage harmful driving behavior. However, the problem of older fleets being used by many companies remains a challenge. With aging fleet vehicles, telematics cannot play its part effectively.

5.2 Additional Feedback

As can be seen in table 12, the results show that several respondents experienced challenges with the existing telematics system. While 64.7% reported having problems, 35.3% reported not experiencing any. This implies that despite offering operational efficiencies, the development of telematics systems is not flawless, with issues such as connectivity problems and data inaccuracies affecting vehicle routes and fuel efficiency.

In addressing these problems, most respondents offered recommendations. As shown in Table 13, 70.6% provided suggestions, while 29.4% did not. These recommendations included regular software upgrades to tackle emerging issues, better integration with existing fleet management systems and proper employee training.

Respondents also highlighted the importance of feedback and continuous system improvements. These processes enable reported challenges to be addressed promptly, ensuring necessary adjustments and enhancing overall system performance for all stake holders.

5.3 Conclusions

5.3.1 Vehicle Tracking and Route Optimization

The results of the research indicate that telematics technology is quite useful in vehicle tracking and route optimization in fleet management. It provides the ability to monitor real-time vehicle tracking and helps manage all aspects of fleet activities effectively. Other advantages mentioned by respondents include improved route planning that contributes to a reduction in travel time and less fuel consumption.

5.3.2 Driver Behavior Monitoring and Fuel Efficiency

As shown in the results of the research, the implementation of telematics technology helps improve driver behavior and fuel efficiency in fleet management significantly. The use of telematics allows tracking driver's behavior and makes them more safely since it discourages them from taking any reckless actions during their work (e.g., aggressive acceleration and braking). Furthermore, the use of telematics technology contributes to the improvement of fuel efficiency since it promotes more optimal vehicle usage through reduced idling, optimized route management, smoother acceleration and responsible driving.

5.3.3 Fuel Management Systems and Environmental Impact

According to the results, the implementation of telematics is necessary to achieve the goals of improving fuel efficiency and environmental sustainability of a company. Respondents agree that telematics allows managers to track the use of fuel within the fleet, helping identifying inefficiencies such as excessive idling and aggressive driving. Moreover, telematics contributes to the development of sustainable behaviors that promote more efficient fuel use and optimal routing. At the same time, telematics may be less effective depending on how it is utilized and whether there are older cars within the fleet.

5.4 Recommendations

Enhancement of System Reliability and Integration. To make the best use of telematics in the operations of Glovo Uganda Limited, there is need for upgrading the telematics infrastructure to provide more accurate GPS and allow for integration with live traffic information. Advanced features such as predictive analysis will assist in predicting traffic disruptions and making wise decisions in selecting routes for delivery vehicles.

Driver Training and Support. Drivers will be adequately trained and supported throughout their use of telematics systems. This involves teaching the drivers the purpose of the telematics system and benefits associated with the technology. Also, positive reinforcement of safe driving behaviors through feedback and recognition of the drivers' efforts will help them adhere to safety guidelines. Clear communication f how monitoring data is employed is key in developing trust.

Integration of Predictive Analytics. Telematics systems that are equipped with predictive technologies will greatly help Glovo Uganda Limited to make informed decisions. The organization can predict vehicle traffic flows and the need for vehicle maintenance by analyzing historical data. For instance, the firm can engage in predictive maintenance and avoid costly repairs and downtime of vehicles.

Investment in Environmentally Friendly Fleet Options. Integration of electric or hybrid vehicles in the operation of Glovo Uganda Limited's telematics systems will promote the green environment. These types of vehicles emit fewer emissions compared to conventional gas-powered engines, thereby reducing pollution. In addition, integrating these types of vehicles will help Glovo Uganda Limited comply with regulations related to environmental conservation.

Strengthening Data Security and Privacy Protection. Considering that telematics systems store and transmit critical information, it becomes imperative to take appropriate measures to safeguard the data. Glovo Uganda Limited can employ measures such as encryption of data, limiting access rights and conducting regular system audits. It is also important to develop policies for information management.

5.5 Practice and Policy Implications

These research findings are very relevant to practical application in terms of the implementation of the discussed approaches to real-world scenarios within Uganda's logistics and transport operations. Within the industry context, organizations should be motivated to embrace telematics technologies which help achieve increased efficiency, enhanced fleet control and sustainable development goals.

Within the policy context, government and regulators can promote the use of telematics through developing favorable conditions for adopting these technologies. For example, tax breaks or subsidies can serve as powerful motivators that will make more organizations adopt telematics technologies.

At the same time, the results of the present study can facilitate the introduction of guidelines within the industry and create standards for the proper use of telematics technologies. By doing so, organizations will be able to use telematics technologies to their fullest extent in order to maximize the benefits gained.

Thus, the implementation of these recommendations will make organizations more competitive while facilitating cost and operation efficiency and sustainable development. In particular, Glovo Uganda Limited can significantly benefit from applying the proposed telematics technologies.

5.6 Limitations and Areas for Further Research

While there have been valuable contributions made to our understanding of how telematics technology plays a role in the efficient running of fleets with companies, it would be worthwhile to consider the limitations of this study. Firstly, the research was carried out using the company of Glovo Uganda Limited and thus the conclusions that were derived cannot be generalized to other organizations in the logistics industry.

Secondly, some reliability problems were experienced and these include instances where the telematics system was not always reliable when sending information as well as difficulties in receiving GPS signals rom time to time. In other words, there were instances where the telematics system proved to be unreliable as far as its efficiency in collecting information is concerned.

Further research is necessary in order to build upon these findings. This includes the collection of data from multiple logistics companies operating in diverse industries so as to arrive at meaningful conclusions. The relationship between telematics and emerging technologies such as artificial intelligence and machine learning can be explored further to enhance data analysis within the scope of fleet management.

5.7 Summary

The results on the application of the telematics technology towards achieving efficient and sustainable fleet operations in Glovo Uganda are covered in chapter 5 of this dissertation. According to the research findings, overcoming the limitations of the system, supporting the drivers and integrating the data effectively are essential in optimizing the benefits of the telematics technology. The implementation of the suggestions of this study will facilitate efficient fleet management by Glovo Uganda.

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APPENDICES.

Appendix 1: Introductory Letter

UGANDA CHRISTIAN UNIVERSITY

A Centre of Excellence in the Heart of Africa

School of Business

19th March 2026

Dear Sir/Madam

Re: Introduction of Namugi Juan Samuel, M23B12/095 for Data Collection Permission

I am writing to introduce **Ms.Namugi Juan Samuel, M23B12/095** , a student of **Bachelors' Degree in Procurement and Logistics Management** at Uganda Christian University. **Namugi Juan Samuel, M23B12/095**, is currently in the advanced stage of her academic journey and is conducting a dissertation on **"THE IMPACT OF TELEMATICS IN FLEET EFFICIENCY AND SUSTAINABILITY."**

I assure you that **Ms.Namugi Juan Samuel, M23B12/095,** will adhere to all ethical guidelines and treat any data collected with the utmost confidentiality. She is a responsible student dedicated to conducting a thorough and rigorous study.

We kindly request your support in granting **Ms.Namugi Juan Samuel, M23B12/095** access to relevant data and personnel within any department and as well as any personnel with objective knowledge regarding her topic. Your valuable insights will significantly contribute to the success and quality of her research.

Thank you for considering her request. Should you require any additional information, please do not hesitate to contact me on the address provided here below.

Sincerely,

....

Mukisa Simon Peter
Lecturer and undergraduate
Research coordinator UCU School of Business
Email smukisa@ucu.ac.ug Mob. 0752938600

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Founded by the Province of the Church of Uganda. Chartered by the Government of the Republic of Uganda

Appendix 2: Questionnaire

Questionnaire for Glovo Uganda Employees

Dear respondent

My name is **Namugi Juan Samuel**, and I am currently studying at Uganda Christian University, researching on "**The Impact of Telematics on Fleet Efficiency and Sustainability**: Case Study of Glovo Uganda." This research is part of the requirements for the award of Bachelor's degree in Procurement and Logistics Management. Your participation in this study by completing the questionnaire is highly valued and will provide valuable insights into the impact of vehicle tracking on route optimization, impact of driver behavior monitoring on fuel efficiency and fuel management systems efficiency in minimizing environmental impact.

Instructions to respondents

Please respond to all questions truthfully and as accurately as possible. Your answers will remain confidential and will be used exclusively for the purpose of this study. For close ended items, kindly choose the option that best reflects your view and for open ended items, please provide detailed and comprehensive response.

Section One: General Information

1. Your Role within Fleet Management

Operations Staf ☐

Fleet Manager ☐

Driver ☐

Other (Please specify): ……………

2. Number of years working with Telematics Technology

Less than 1 year ☐

1-3 years ☐

4-6 years ☐

☐

More than 6 years

Section Two: Vehicle Tracking and Route Optimization

3. The telematics system is efficient in monitoring and reporting vehicle locations.

True ☐ Fals☐

4. The use of telematics technology has significantly improved the optimization of delivery routes.

True ☐ Fal☐

5. What issues or challenges have arisen in your use of telematics systems for tracking vehicles and planning routes?

………
…………………………………………………………….

……………………………………………………………………………………………….

Section Three: Driver Behavior Monitoring and Fuel Efficiency

6. Telematics based monitoring of driver behavior effectively improves overall driving safety.

True ☐ Fal☐

7. Telematics is efficient in optimizing/ improving fuel consumption.

True ☐ Fal☐

Section Four: Fuel Management Systems and Environmental Impact

8. The use of telematics contributes positively to the effectiveness of fuel management systems.

True ☐ Fal☐

9. Telematics technology effectively reduces the environmental impact of fleet operations.

True ☐ Fa☐

Section Five: Additional Feedback

10. I face challenges in the operation of the current telematics system.

True ☐ Fa☐

11. What recommendations can you provide to improve the effectiveness of the telematics technology used in your organization?

……
……
………………………..

Thank you for your participation. Your effort and willingness to provide honest responses are greatly appreciated and the information you have shared is invaluable to this study and will significantly contribute to the achievement of the research objectives.

Note: If you would like to receive a summary of the findings

Yes (Please provide email………)

No

Date…………………

Appendix 3: Interview Guide

Interview Guide for Glovo Uganda Employees

Introduction

Good day. My name is **Namugi Juan Samuel** a student at Uganda Christian University conducting academic research titled "**The Impact of Telematics in Fleet Efficiency and Sustainability**: A Case Study of Glovo Uganda." The purpose of this interview is to gather in depth information on the use of telematics in fleet operations at Glovo Uganda particularly in relation to vehicle tracking, route optimization. Driver behavior analysis and vehicle fuel economy & environmental impact. Data received will be strictly confidential and used only for academic research.

Section One: Background Information

1. Kindly indicate your current position within fleet management team of Glovo Uganda.

2. For how many years have you worked with telematics technology in your current position.

Section Two: Vehicle Tracking and Route Optimization

3. Can you describe how telematics technology is used to track vehicle locations in Glovo Uganda's operations?

4. In your opinion, how does telematics-based vehicle track affect route planning and optimization?

5. What benefits have you experienced from using telematics in improving route optimization and delivery efficiency?

6. What challenges or limitations have you faced when using telematics for vehicle tracking and route planning?

Section Three: Driver Behavior Monitoring and Fuel Efficiency

7. How does telematics help to track the behavior of drivers in fleet management?

8. What is your view on the effectiveness of driver behavior tracking in enhancing driving safety?

9. How much has telematics helped improve fuel efficiency and conservation?

10. Are there any driver behaviors detected by telematics that impact fuel consumption? Please explain.

Section Four: Fuel Management Systems and Environmental Performance

11. How does telematics technology help in managing and controlling fuel usage in the company?

12. How does telematics help mitigate environmental issues such as fuel wastage, emissions and unnecessary mileage?

13. What is your evaluation of the effectiveness of telematics in promoting environmentally sustainable fleet operations at Glovo Uganda?

Section Five: Challenges and Recommendations

14. What are the major challenges you face in implementing the current telematics system?

15. What suggestions would you make to improve the use of telematics for enhancing fleet efficiency and sustainability at Glovo Uganda?

Closing Statement

I am extremely grateful for your time and contributions. Your insights are highly valued and will significantly contribute to the successful completion of this research.