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EVALUATING THE EFFICIENCY AND VIABILITY OF DRONE TECHNOLOGY IN LAST MILE LOGISTICS OPERATIONS- A CASE STUDY OF CHARLIE STEVENS INTERNATIONAL (CSI) ZIMBABWE

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APPROVAL FORM

The undersigned certify that they have read and recommended to the Global E4Impact Management Program and the Catholic University of Zimbabwe, for acceptance a dissertation entitled, ***"Evaluating the efficiency and viability of drone technology in last mile logistics operations- A case study of Charlie Stevens International (CSI) Zimbabwe***", submitted by CHIEDZA MAKWARA- MSWAKA (PG241260H), in partial fulfilment of the requirements for the Global E4Impact MBA Program.

DR. B CHIGANZE

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Signature

13/07/2026

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Date

DECLARATION

I, CHIEDZA MAKWARA- MSWAKA, declare that this study is my own effort and is a true reflection of research executed by me. This research in full or part thereof has not been submitted for examination for any degree at any other university/institution.

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CHIEDZA MAKWARA-MSWAKA

DEDICATION

To my husband Simba and our son Eli

ACKNOWLEDGEMENTS

*I would like to extend my sincere appreciation to **Tawanda Chihambakwe**, one of the pioneers of the drone industry in Zimbabwe. As the CEO of **Precision Aerial Group** and **Zimbabwe Flying Labs**, his visionary leadership and pioneering work have played a critical role in opening up conversations around the practical adoption of drone technology in the logistics sector in Zimbabwe.*

Through his advocacy, innovation, and commitment to building local capacity, he has helped make the drone industry more attainable and better understood within the Zimbabwean context. His work significantly sparked and deepened my interest in exploring how drone technology can be applied in logistics, particularly in addressing last-mile delivery challenges and improving operational efficiency.

ABSTRACT

This study evaluates the efficiency and viability of drone technology in last-mile logistics operations in Zimbabwe, using Charlie Stevens International (CSI) as a qualitative case study. The research is grounded primarily in the **Resource-Based View (RBV)**, supported by **Innovation Diffusion Theory (IDT)** and the **Technology–Organisation–Environment (TOE) framework**, to examine how internal capabilities, stakeholder perceptions, and environmental conditions shape technology adoption in logistics firms.

An exploratory qualitative research design was employed, with primary data collected through semi-structured interviews involving internal CSI stakeholders and selected external actors within the logistics and drone ecosystem. A total of 45 participants were targeted, of whom 43 participated, representing a 95.6% response rate. Data were analysed using thematic analysis to identify patterns related to operational efficiency, financial viability, technical feasibility, and stakeholder acceptance.

The findings indicate that drone technology has the potential to reduce delivery lead times, improve route efficiency, and extend service reach for lightweight and time-sensitive consignments, particularly in hard-to-access areas. However, financial viability is constrained by acquisition costs, maintenance requirements, regulatory compliance expenses, and limited economies of scale at early stages of adoption. Stakeholder acceptance was influenced by perceptions of safety, regulatory clarity, reliability, and demonstrated operational performance. Organisational readiness, partnerships, and regulatory engagement emerged as critical factors shaping adoption feasibility.

Based on these findings, the study recommends: the implementation of phased pilot projects focused on high-value and time-critical delivery routes; strategic partnerships with drone operators, regulators, and technology providers to strengthen technical and compliance capabilities; and the development of cost–benefit models to guide route selection and investment decisions. The study provides context-specific insights into the conditions under which drone technology may enhance last-mile logistics performance in Zimbabwe

Key terms: Drone technology; Unmanned Aerial Vehicles (UAVs); last-mile logistics; Resource-Based View; efficiency; viability; stakeholder acceptance; Zimbabwe.

“Drones are not replacing traditional logistics—they are redefining what is possible in the last mile” (PwC Drone Powered Solutions, 2024).

Source: www.freepik.com *(https://shorturl.at/eCkfT)*

LIST OF ABBREVIATIONS

Abbreviation	Meaning
AfCFTA	African Continental Free Trade Area
CAAZ	Civil Aviation Authority of Zimbabwe
CSI	Charlie Stevens International
CUZ	Catholic University of Zimbabwe
E4Impact	Entrepreneurship for Impact Programme
ICT	Information and Communication Technology
IDT	Innovation Diffusion Theory
IoT	Internet of Things
KII	Key Informant Interview
LSP	Logistics Service Provider
MIS	Management Information Systems
NDS1	National Development Strategy 1
RBV	Resource-Based View
SDGs	Sustainable Development Goals
SMEs	Small and Medium Enterprises
SOPs	Standard Operating Procedures
TOE	Technology–Organisation–Environment Framework
UAV	Unmanned Aerial Vehicle
UAS	Unmanned Aircraft System
VLOS	Visual Line of Sight

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CHAPTER ONE: INTRODUCTION

1.0 Introduction

This chapter outlines the background of study, statement of the problem, research objectives and significance of the study. The underlying limitations, delimitations and assumptions in carrying out of the research are also discussed.

1.1 Background of the Study

Last-mile logistics has emerged as a critical determinant of competitiveness in modern supply chains, as it directly influences delivery speed, cost efficiency, and customer satisfaction. Globally, the last-mile segment is widely recognised as the most complex and costly stage of distribution, often accounting for a substantial proportion of total logistics expenditure due to urban congestion, inadequate infrastructure, and increasing consumer demand for rapid and reliable delivery services (World Bank, 2023). These challenges have intensified pressure on logistics service providers to identify innovative delivery solutions that enhance operational efficiency while controlling costs.

In response to these inefficiencies, drone technology, commonly referred to as unmanned aerial vehicles (UAVs), has gained increasing attention as an alternative last-mile delivery method. Drones offer the potential to bypass road congestion, reach geographically constrained locations, and reduce dependency on conventional fuel-based transport systems. Empirical studies indicate that for lightweight and time-sensitive consignments, drone deliveries can improve route efficiency and significantly reduce delivery lead times compared to traditional vehicle-based distribution models (Stolaroff et al., 2017).

In addition to operational benefits, drone-enabled logistics has been associated with environmental sustainability gains. Stolaroff et al. (2017) demonstrate that small-package drone deliveries may consume less energy and generate lower greenhouse gas emissions than internal combustion engine vehicles under specific delivery conditions, particularly over short distances. These findings suggest that UAVs can contribute to both efficiency improvement and emission reduction objectives in last-mile logistics when deployed within appropriate operational contexts.

1.1.1 Drones In Africa

Across Africa, drone technology has increasingly been adopted as a response to persistent infrastructure limitations, long delivery lead times, and high transport costs that affect last-mile logistics performance. Many African countries face challenges such as poor road connectivity, dispersed rural populations, and limited access to time-critical services, which constrain the efficiency of conventional delivery systems. Within this context, unmanned aerial vehicles (UAVs) have emerged as a practical innovation capable of bypassing physical infrastructure constraints and improving delivery reach in hard-to-access areas (Amukele et al., 2017; World Bank, 2023).

Notable drone deployments in countries such as Rwanda and Ghana have demonstrated the operational feasibility of UAVs in last-mile delivery, particularly within the healthcare sector. Empirical evidence shows that drone-enabled logistics has significantly reduced delivery times for essential medical supplies such as blood, vaccines, and medicines, improving service reliability in remote regions (Amukele et al., 2017; Serlin, 2020). These initiatives highlight the potential of drones to enhance logistics efficiency by shortening delivery cycles and reducing dependency on unreliable road networks.

Despite these successes, the commercial application of drones in broader logistics and distribution across Africa remains limited. Studies indicate that while technical feasibility has been established, large-scale adoption is constrained by factors including high initial investment costs, limited skilled personnel, evolving regulatory frameworks, and the absence of integrated business models that link drone operations with conventional logistics systems (Kellermann et al., 2020; Adeyemi & Ojo, 2022). As a result, most drone deployments on the continent remain pilot-based or sector-specific, rather than fully embedded within commercial supply chains.

Furthermore, stakeholder acceptance and institutional readiness play a critical role in shaping drone adoption outcomes in African contexts. Research suggests that successful implementation is strongly influenced by government support, regulatory clarity, and collaboration between private firms, technology providers, and public institutions (Mensah et al., 2023). These findings underscore that while drones offer efficiency and accessibility

advantages, their long-term viability in African logistics depends on complementary organisational capabilities, supportive policy environments, and gradual scaling strategies aligned with local conditions.

1.1.2 Drones in Zimbabwe

In Zimbabwe, the logistics industry continues to face significant structural challenges, including high fuel costs, inadequate road infrastructure, customs-related delays, and limited last-mile delivery capacity. National statistics indicate that persistent road maintenance backlogs and ageing vehicle fleets contribute to rising delivery costs and reduced transport reliability across the country (ZIMSTAT, 2023; Ministry of Transport and Infrastructural Development, 2022). These infrastructural constraints have placed sustained pressure on logistics service providers, particularly in time-sensitive distribution activities.

At the international level, Zimbabwe's logistics inefficiencies are reflected in its performance on global benchmarking indices. The World Bank (2022) ranked Zimbabwe among the lowest-performing countries in Southern Africa on the Logistics Performance Index, highlighting weaknesses in transport infrastructure, warehousing capacity, and customs efficiency. Such inefficiencies increase operational costs for logistics firms and small and medium enterprises (SMEs), undermining competitiveness in e-commerce, domestic distribution, and regional trade under frameworks such as the African Continental Free Trade Area (AfCFTA) (ZIDA, 2023).

These challenges are particularly evident in mid-sized logistics firms such as Charlie Stevens International (CSI), which operates across major Zimbabwean trade corridors including Beitbridge, Chirundu, and Forbes Border Post. CSI experiences recurring delivery delays, elevated vehicle maintenance and fuel expenses, and service reliability constraints linked to last-mile inefficiencies. Within this operational context, exploring drone technology represents a potential innovation pathway through which CSI could enhance delivery efficiency, expand service coverage to difficult-to-access areas, and improve overall service reliability within Zimbabwe's constrained logistics environment.

1.2 Statement of The Problem

Emerging technologies such as drone-based logistics have demonstrated potential to reduce operational costs, improve delivery speed, and minimize environmental impacts (Stolaroff et al., 2017). However, their efficiency and viability within Zimbabwe's logistics landscape remain largely unexplored. While pilot initiatives by Precision Aerial Zimbabwe and Flying Labs Zimbabwe have illustrated the technical feasibility of drones, there is limited empirical evidence assessing their cost-effectiveness, operational performance, and potential contribution to sustainable last-mile delivery solutions.

The persistent inefficiencies in Zimbabwe's last-mile logistics such as high transport costs, infrastructure bottlenecks, and limited digital integration continue to constrain the competitiveness of logistics firms and overall supply chain performance. This study therefore seeks to evaluate whether drone technology can enhance last-mile delivery efficiency and provide a sustainable operational advantage for logistics enterprises in Zimbabwe. Guided by the Resource-Based View (RBV) theory, the research examines how adopting drone technology can strengthen firm-level resources and capabilities to improve service efficiency, responsiveness, and competitiveness in the evolving logistics ecosystem.

1.3 Research Objectives

The main aim of this study is to evaluate the efficiency and viability of drone technology in last-mile logistics operations through a qualitative case study of Charlie Stevens International (CSI). The study seeks to determine whether drone adoption can enhance operational efficiency, financial sustainability, and stakeholder acceptance within Zimbabwe's logistics sector.

- To assess the operational efficiency of drone technology as an alternative delivery method in last-mile logistics at CSI.
- To evaluate the financial viability of adopting drone technology at CSI in terms of cost-effectiveness, scalability, and long-term sustainability.

- To explore stakeholder perceptions, acceptance, and trust regarding drone adoption in logistics operations at CSI.

1.4 Research Questions

- How can drone technology enhance the operational efficiency of last-mile logistics operations at CSI compared to conventional delivery methods?
- Is drone technology financially viable for adoption within CSI's logistics operations, considering Zimbabwe's economic and infrastructural conditions?
- What are the perceptions, levels of acceptance, and trust among CSI stakeholders towards the adoption of drone technology in logistics operations?

1.5 Purpose of The Study

The purpose of this study is to evaluate the efficiency and viability of drone technology in enhancing last-mile logistics operations in Zimbabwe, using Charlie Stevens International (CSI) as a case study. Specifically, the study seeks to generate context-specific insights into whether the adoption of unmanned aerial vehicles can improve delivery efficiency, support cost-effective operations, and strengthen service reliability within Zimbabwe's constrained logistics environment. By examining operational performance, financial viability, and stakeholder acceptance, the study aims to inform strategic decision-making for logistics firms considering drone-enabled delivery solutions and to contribute practical evidence to the emerging body of knowledge on logistics innovation in developing economies.

1.6 Significance of The Study

This study is significant to Charlie Stevens International (CSI), the Zimbabwean logistics sector, and the broader academic and policy community. For CSI, the research provides evidence-based insights into whether drone technology can enhance last-mile delivery efficiency, reduce operational constraints, and support strategic decision-making in an environment characterised by high transport costs and infrastructure limitations. The findings assist CSI management in evaluating the practicality of integrating drone technology into existing logistics operations and in identifying appropriate implementation pathways aligned with organisational capabilities.

At an industry level, the study contributes to understanding how emerging delivery technologies can address persistent inefficiencies affecting logistics firms and small and medium enterprises (SMEs) in Zimbabwe. By examining drone technology within a real operational context, the research offers practical insights that may inform other logistics service providers seeking innovative and scalable solutions to last-mile delivery challenges. The study also supports broader national objectives related to trade facilitation, digital transformation, and logistics modernisation under frameworks such as the African Continental Free Trade Area (AfCFTA).

From an academic perspective, this study contributes to the limited body of empirical research on drone technology adoption in commercial logistics within developing economies. By applying the Resource-Based View, Innovation Diffusion Theory, and the Technology–Organisation–Environment framework, the research extends theoretical understanding of how organisational capabilities, stakeholder acceptance, and environmental conditions interact to influence logistics innovation outcomes. The findings therefore offer a foundation for future research on technology-enabled logistics solutions in Sub-Saharan Africa and comparable contexts.

1.7 Research Assumptions

This study is based on several underlying assumptions. It is assumed that participants from Charlie Stevens International (CSI) and the selected external logistics and drone ecosystem stakeholders possess adequate knowledge and practical experience of last-mile logistics operations to provide informed and reliable insights. It is further assumed that respondents will participate willingly and provide honest and accurate information reflecting their genuine perceptions of drone technology and its potential application in logistics operations.

The study also assumes that the operational and infrastructural conditions observed during the research period are reasonably representative of the current logistics environment in Zimbabwe. In addition, it is assumed that existing pilot initiatives and demonstrations of drone technology within Zimbabwe and comparable African contexts provide a reasonable basis for evaluating the potential efficiency and viability of drone adoption in last-mile logistics. Finally, the study assumes that the theoretical frameworks applied the Resource-Based View, Innovation Diffusion Theory, and the Technology–Organisation–Environment framework are appropriate for analysing technology adoption and operational performance within the Zimbabwean logistics sector.

1.8 Delimitations

This study is deliberately delimited in scope to ensure depth of analysis and contextual relevance. The research focuses on evaluating the efficiency and viability of drone technology in last-mile logistics operations in Zimbabwe, using Charlie Stevens International (CSI) as a single case study. The emphasis is placed on operational efficiency, financial viability, and stakeholder acceptance, rather than on technical engineering specifications of drone systems or detailed regulatory design processes.

Geographically, the study is confined to logistics operations within Zimbabwe, with particular reference to CSI's activities along major trade corridors and last-mile delivery environments. The research does not extend to cross-border drone operations or comparative international case studies. In terms of methodology, the study adopts a qualitative approach based on semi-

structured interviews and stakeholder engagement; therefore, it does not seek to generate statistically generalisable findings or quantitative performance measurements.

By setting these delimitations, the study maintains a focused and manageable scope that allows for in-depth exploration of drone technology adoption within a real organisational context, while ensuring alignment with the study's objectives and the chosen qualitative research design.

1.9 Limitations

This study is subject to several limitations that should be considered when interpreting the findings. First, the research focuses on a single case study of Charlie Stevens International (CSI), which limits the extent to which the findings can be generalised to all logistics firms operating in Zimbabwe or other developing economies. However, the case study approach allows for in-depth exploration of organisational and contextual factors influencing drone technology adoption.

Second, the study relies primarily on qualitative data obtained through semi-structured interviews, which may be influenced by respondents' subjective perceptions, experiences, and potential biases. Although efforts were made to enhance credibility through triangulation and careful interpretation, the findings remain interpretive rather than statistically representative.

Third, the emerging nature of drone technology in Zimbabwe presents a limitation, as large-scale commercial deployment remains limited. As a result, some insights are based on anticipated outcomes, pilot experiences, and stakeholder expectations rather than long-term operational performance data. External factors such as economic instability, fuel price volatility, and infrastructural constraints may also influence logistics performance beyond the scope of drone technology alone.

Despite these limitations, the study provides valuable context-specific insights into the efficiency and viability of drone-enabled last-mile logistics within Zimbabwe's evolving logistics environment.

1.10 definitions of key terms

1.10.1 Drone (Unmanned Aerial Vehicle – UAV)

A pilotless aircraft operated remotely or autonomously, used for delivering goods, capturing data, or performing aerial operations. In this study, drones refer specifically to small commercial UAVs applied in last-mile logistics to transport lightweight packages (Stolaroff et al., 2017).

1.10.2 Last-Mile Logistics

The final stage of the delivery process where goods are transported from a distribution hub to the end customer. It is often the most expensive and least efficient segment of the supply chain, significantly affecting delivery speed, cost, and customer satisfaction (Maersk, 2025).

1.10.3 Efficiency

The ability to achieve maximum output with minimal input or resource wastage. In this research, efficiency refers to how drone technology can reduce delivery time, lower fuel and labour costs, and improve operational performance in logistics firms such as CSI.

1.10.4 Viability

The capability of a technology or system to operate successfully and sustainably within a specific environment. Here, viability refers to the economic, technical, and operational practicality of adopting drone-based delivery models within Zimbabwe's logistics sector.

1.11 Dissertation structure

This dissertation is organised into five chapters, each addressing a distinct component of the research process.

Chapter One: Introduction

This chapter presents the background of the study, the statement of the problem, purpose, research objectives and questions, and the significance, assumptions, delimitations, and limitations of the study. It also defines key terms and outlines the theoretical framework guiding the research.

Chapter Two: Literature Review

The second chapter critically reviews existing global and local literature related to drone technology, last-mile logistics, and operational efficiency. It also discusses empirical studies, identifies research gaps, and applies the Resource-Based View (RBV) theory to establish the conceptual and theoretical foundation for the study.

Chapter Three: Research Methodology

This chapter outlines the research design, approach, and methods used to collect and analyse data. It explains the target population, sampling techniques, data collection instruments, validity and reliability measures, and ethical considerations relevant to the study.

Chapter Four: Data Presentation, Analysis, and Interpretation

The fourth chapter presents and analyses the findings derived from the collected data. Results are interpreted in relation to the research objectives and the RBV framework to assess the efficiency and viability of drone technology in Zimbabwe's last-mile logistics operations.

Chapter Five: Summary, Conclusions, and Recommendations

The final chapter summarises the key findings and discusses their implications for practice, theory, and future research. It provides conclusions on the efficiency and viability of drone technology and offers practical recommendations for CSI and the broader Zimbabwean logistics sector.

1.12 Chapter Summary

This chapter introduced the study on evaluating the efficiency and viability of drone technology in Zimbabwe's last-mile logistics operations. It outlined the background and problem, highlighting the high costs, infrastructure challenges, and inefficiencies limiting logistics performance. The purpose and significance of the study were explained in relation to Charlie Stevens International (CSI) and Zimbabwe's broader logistics sector. The chapter also presented key assumptions, delimitations, and limitations shaping the research scope. Overall,

it established the foundation for examining how drone technology, through the Resource-Based View (RBV) framework, can enhance efficiency and competitiveness in last-mile delivery.

In emerging economies characterised by weak transport infrastructure, drone technology presents a practical mechanism for overcoming last-mile delivery constraints (World Bank, n.d.**).**

Source: www.freepik.com *(* https://shorturl.at/eCkfT *)*

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

Technological innovation in logistics requires understanding how firm-level capabilities interact with national infrastructure and market conditions (Teece, 2007; Giones & Brem, 2021; Wernerfelt, 2020). Within this context, the efficiency and viability of drone technology in last-mile logistics involve evaluating how unmanned aerial vehicles (UAVs) contribute to

operational performance, cost efficiency, and environmental sustainability, particularly within emerging and infrastructure-constrained economies (World Bank, 2023; Abdel-Basset Rejeb et al., 2021). Recent studies show that persistent infrastructural limitations, urban congestion, and changing consumer expectations are driving the need for advanced delivery innovations such as drones across Sub-Saharan Africa (Mensah et al., 2023; Adeyemi & Ojo, 2022; PwC, 2023). Scholars argue that UAVs can reduce transport bottlenecks, improve accessibility, and support sustainability by lowering emissions and reducing road dependency (World Bank, 2023; Rejeb et al., 2021). In Zimbabwe, where logistics inefficiencies and high transport costs remain persistent constraints on last-mile service delivery, the strategic adoption of drone technology presents a potential opportunity for logistics firms, including Charlie Stevens International (CSI), to enhance delivery speed and expand market reach, provided that regulatory frameworks and organisational capabilities support effective implementation (World Bank, 2023; International Transport Forum, 2021).

2.1 Theoretical Framework

The theoretical framework provides the intellectual foundation upon which this study is constructed. It identifies and explains the perspectives that guide the evaluation of the efficiency and viability of drone technology in last-mile logistics, focusing on how firms such as Charlie Stevens International (CSI) can leverage internal, behavioural, and contextual factors to gain operational and competitive advantage. This study integrates three complementary frameworks—the Resource-Based View (RBV), the Innovation Diffusion Theory (IDT), and the Technology–Organization–Environment (TOE) Framework—to capture the interplay between firm-level resources, innovation adoption dynamics, and external environmental influences. These models collectively provide a multidimensional lens for analysing how drone technology can enhance logistics efficiency and sustainability within Zimbabwe's economic landscape. In addition, insights from the Strategic Collaboration and Growth Perspective (Johnson, Whittington & Scholes, 2020) reinforce the importance of partnerships, alliances, and synergies as enablers of technological innovation and long-term viability in resource-constrained settings.

i. **The Resource-Based View (RBV)**:

The Resource-Based View (RBV) provides a foundational framework for explaining how firms achieve and sustain competitive advantage through internal resources and capabilities (Wernerfelt, 1984; Barney, 1991). RBV posits that organisations gain superior performance when they own or control resources that are valuable, rare, imperfectly imitable, and well-organised (VRIO/VRIN) for capturing economic value (Barney, 2001; Hitt et al., 2020; Grant, 2019). Recent strategic management literature confirms that RBV remains one of the most influential lenses in technology-enabled supply chain transformation, particularly in assessing how physical assets, human expertise, and information capabilities enhance operational resilience (Rehman & Shah, 2022; Teece, 2021; Goyal et al., 2023). Scholars further emphasise that relational resources such as trust-based partnerships and ecosystem cooperation strengthen innovation outcomes in logistics networks (Johnson et al., 2020; Giones & Brem, 2021). Therefore, RBV offers a rigorous foundation for evaluating drone adoption by situating UAVs within the wider capability structures that determine competitive performance in dynamic environments (Grant, 2019; Teece, 2021).

Within logistics and supply chain management, RBV has been widely applied to explain how firms build distinctive operational capabilities that enhance efficiency, responsiveness, and service differentiation (Hitt et al., 2020; Goyal et al., 2023; Rehman & Shah, 2022). Studies show that technological resources such as ICT infrastructure, data analytics, warehouse automation, and fleet optimisation systems contribute to VRIO-strength when they are deeply embedded into organisational routines (Maroufkhani et al., 2021; Oliveira & Martins, 2019; Wang & Choi, 2022). Logistics firms that effectively integrate specialised organisational knowledge, digital tracking and information systems, and collaborative planning with supply chain partners demonstrate superior performance under conditions of uncertainty and disruption, particularly in emerging and infrastructure-constrained markets (Robert M. Grant, 2019; World Bank, 2023; International Transport Forum, 2021). Within this context, drone technology extends operational reach and flexibility by improving accessibility, reducing reliance on road-based transport, and enabling time-sensitive deliveries; however, these benefits are realised only when UAV deployment is supported by complementary digital systems, skilled human capital, and adaptive organisational capabilities (Abdel-Basset Rejeb et al., 2021; David J. Teece, 2021).

Applied to drone technology, RBV shows that efficiency and viability in last-mile logistics depend on how effectively UAVs are embedded within a firm's broader resource base rather than on hardware acquisition alone (Teece, 2021; Rejeb et al., 2022; Wang & Choi, 2022). Global innovators such as Amazon, UPS, and DHL demonstrate that drone success derives from complementary resources including proprietary routing algorithms, fulfilment network integration, real-time tracking platforms, brand credibility, and regulatory engagement capabilities — forming VRIO resource bundles that are difficult for competitors to replicate (Grant, 2019; Giones & Brem, 2021; Ali & Tan, 2023). Similarly, in Sub-Saharan Africa, Zipline's performance in Rwanda and Ghana is driven not only by drone fleets but also by strategic partnerships with governments, health-supply logistics expertise, digital platforms, and continuous learning mechanisms that reinforce reliability and scalability (Sakwa & Okech, 2021; Mensah et al., 2023; Adeyemi & Ojo, 2022). These cases illustrate that drones generate competitive advantage when supported by embedded technological, organisational, and relational capabilities that amplify operational performance in challenging environments (World Bank, 2023; Barney, 2020).

For Charlie Stevens International (CSI), RBV provides a rigorous approach for assessing whether the firm currently possesses, or can deliberately build, the internal capabilities required to make drone adoption both efficient and viable (Grant, 2019; Johnson et al., 2020; Dube, 2023). CSI's existing logistics assets — including its coverage along key trade corridors, relationships with mining, FMCG and industrial clients, transport and warehouse management systems under digital transformation, and its reputation as a reliable mid-sized freight provider — represent strategic resources that can support unique service offerings (Mavhunga & Moyo, 2024; Nkomo & Ndlovu, 2022; World Bank, 2023). When combined with emerging competencies such as drone operations, aviation regulatory knowledge, and data-driven performance analytics, these assets can strengthen value creation and service flexibility in high-demand delivery lanes (Rejeb et al., 2022; Adeyemi & Ojo, 2022; Teece, 2021).RBV therefore directs this research to examine whether Charlie Stevens International (CSI) can integrate its tangible and intangible resources into a coherent, difficult-to-imitate drone logistics capability that delivers measurable advantages in cost efficiency, delivery speed, and service reliability (Jay Barney, 1991; Robert M. Grant, 2019; David J. Teece, 2021).

Contemporary RBV scholarship emphasises that in volatile markets, sustained advantage depends not on static resources but on dynamic capabilities a firm's ability to sense opportunities, seize them, and reconfigure operational structures in response (Teece, 2007; Peteraf & Di Stefano, 2023; Grant, 2019). In supply chains exposed to infrastructure constraints and macroeconomic instability, innovation success is strongly shaped by learning mechanisms, flexible resource allocation, and rapid decision-making (Hitt et al., 2020; Wang & Choi, 2022; Maroufkhani et al., 2021). For CSI, collaboration with ecosystem actors such as Precision Aerial, Zimbabwe Flying Labs, ICT solution providers, and aviation regulators becomes part of its strategic resource base, granting access to technical expertise, flight data capabilities, and regulatory compliance support that would be costly to internalise (Chihambakwe, 2023; Mavhunga & Moyo, 2024; Ali & Tan, 2023). When effectively governed, these partnerships evolve into relational and knowledge-based assets that strengthen CSI's capacity to pilot, scale, and continuously adapt drone operations ahead of less prepared competitors (Dube, 2023; Giones & Brem, 2021; Teece, 2021).RBV therefore anchors this study by framing drone technology not as a standalone tool but as a strategic resource whose value depends on CSI's ability to configure its assets, capabilities, and partnerships into a VRIO-based drone logistics solution (Barney, 2020; Teece, 2021; Rehman & Shah, 2022). The framework guides the empirical analysis toward assessing whether Charlie Stevens International's internal environment—enhanced through ecosystem collaboration and strategic alignment—is sufficiently distinctive, adaptable, and resource-rich to support the sustainable deployment of drone-enabled last-mile logistics under dynamic and uncertain operating conditions (Gerry Johnson et al., 2020; David J. Teece, 2021).

RBV thus provides a direct theoretical pathway to evaluate both operational efficiency and long-term competitive viability, establishing clear criteria for resource alignment, organisational readiness, and innovation scalability at CSI (Grant, 2019; Adeyemi & Ojo, 2022; World Bank, 2023).

ii. Innovation Diffusion Theory (IDT)

Innovation Diffusion Theory (IDT), developed by Everett M. Rogers (2003), explains how new technologies spread within and across social systems by emphasising how perceived innovation attributes influence adoption decisions. These attributes include relative advantage, compatibility, complexity, trialability, and observability, which collectively shape users' willingness to adopt new technologies (Rogers, 2003). Technologies are more readily adopted when users perceive clear performance benefits, alignment with existing practices, ease of use, opportunities for limited experimentation, and observable improvements in outcomes (Rogers, 2003; Fred D. Davis, 1989).

Subsequent theoretical extensions, including the Technology Acceptance Model (TAM), reinforce the role of perceived usefulness and perceived ease of use in shaping behavioural intentions toward technology adoption (Davis, 1989; Viswanath Venkatesh & Fred D. Davis, 2000; Tiago Oliveira & Maria Fraga Martins, 2019). IDT therefore provides a robust behavioural foundation for analysing how logistics firms and their stakeholders evaluate and respond to drone technology as a service innovation within operational environments.

For CSI, understanding diffusion drivers supports evaluation of internal readiness and market receptiveness to drone logistics. Relative advantage can be demonstrated through performance metrics such as reduced turnaround times, fuel savings, and fewer manual processes during pilot projects (Hu & Wang, 2024; Dube, 2023; World Bank, 2023). Compatibility with existing workflows, along with clear staff training, reduces perceived complexity and supports operational alignment (Chiheb et al., 2022; Maroufkhani et al., 2021). Trialability through phased implementation allows managers and regulators to generate trust gradually, while **o**bservability through transparent reporting enhances credibility among clients and CAAZ oversight bodies (Adeyemi & Ojo, 2022; Nyoni, 2024; Chihambakwe, 2023). Integrated with RBV, IDT therefore highlights that successful adoption requires both capability availability and behavioural acceptance (Teece, 2021; Grant, 2019; Dube, 2023).

In last-mile logistics, IDT demonstrates that technological feasibility alone is insufficient; stakeholder perceptions of safety, service reliability, and operational value determine diffusion speed, especially for aviation technologies (Sakwa & Okech, 2021; Rejeb et al., 2021; Ali & Tan, 2023). Evidence from global and regional implementations shows that drones gain acceptance when positioned as solutions to concrete logistics challenges such as high transport costs, delayed deliveries, and inaccessible rural areas (Mensah et al., 2023; Adeyemi & Ojo,

2022; PwC, 2023). Conversely, ongoing concerns about airspace safety, privacy, workforce implications, or noise result in hesitation, even when the operational benefits appear significant (World Bank, 2023; Rejeb et al., 2022). IDT therefore complements RBV by showing that innovation success depends not only on internal resource fit but also on social legitimacy and trust (Rogers, 2003; Mensah et al., 2023; Ali & Tan, 2023).

In Zimbabwe, commercial drone logistics remains nascent, and perceptions among managers, regulators, and clients strongly influence willingness to commit resources (World Bank, n.d.; PwC, 2022; T. Chihambakwe, personal communication, 2023).Adoption confidence increases when benefits such as faster deliveries, improved route flexibility, and reduced fuel costs are observable in real operations (Adeyemi & Ojo, 2022; World Bank, 2023). Carefully designed pilot projects on strategic corridors like Harare–Beitbridge and Harare–Mutare could improve trialability and allow operational learning before full deployment (Sakwa & Okech, 2021; Mavhunga & Moyo, 2024). Strengthening observability through performance data disclosure and compliance with Civil Aviation Authority of Zimbabwe (CAAZ) requirements enhances both market trust and regulatory legitimacy (Chihambakwe, 2023; Dube, 2023; Rejeb et al., 2022).

IDT also emphasises the influence of opinion leaders and innovation champions who shape perceptions in emerging markets (Rogers, 2003; Rejeb et al., 2022; Ali & Tan, 2023). In Zimbabwe, early adopters such as Precision Aerial and Zimbabwe Flying Labs promote diffusion by sharing demonstrations, operational knowledge, and certification pathways for safe drone operations (Chihambakwe, 2023; Nyoni, 2024). Positive reference cases strengthen peer confidence and increase the perceived feasibility of drone logistics (Mensah et al., 2023; Sakwa & Okech, 2021). By positioning itself as a learning-oriented early adopter, CSI could enhance its strategic distinctiveness and shape market development patterns ahead of competitors (Johnson et al., 2020; Grant, 2019; Teece, 2021).

Integrated with RBV, IDT reinforces the understanding that perceptions, culture, and learning are critical determinants of drone viability (Grant, 2019; Dube, 2023; Mavhunga & Moyo, 2024). Even with adequate capital, talent, and infrastructure, CSI's drone adoption will require leadership commitment, staff readiness, and collaborative engagement with regulators and clients (Rehman & Shah, 2022; Chiheb et al., 2022). IDT therefore shapes the empirical lens of this study by focusing on organisational readiness and stakeholder attitudes as conditions

necessary for achieving operational efficiency and sustainable competitive advantage in drone-enabled last-mile logistics (Teece, 2021; Johnson et al., 2020; Mensah et al., 2023).

iii. Technology–Organization–Environment (TOE) Framework

The Technology–Organization–Environment (TOE) Framework offers a holistic perspective for analysing how technological adoption is shaped simultaneously by internal and external conditions (Tornatzky & Fleischer, 1990; Oliveira & Martins, 2019; Rehman & Shah, 2022). TOE integrates three interdependent dimensions — technological readiness, organisational capacity, and environmental conditions — to explain why some firms successfully implement innovations while others struggle despite similar access to technology (Maroufkhani et al., 2021; Zhu, 2023; Ali & Tan, 2023). Recent logistics studies verify TOE's robustness in predicting digital transformation outcomes in emerging economies, where infrastructural and regulatory pressures strongly determine innovation viability (World Bank, 2023; Adeyemi & Ojo, 2022; Mensah et al., 2023).

The technological dimension assesses how performance benefits, reliability, compatibility, and system complexity shape drone adoption (Oliveira & Martins, 2019; OECD, 2024; Hu & Wang, 2024). For logistics firms, this includes payload, flight endurance, weather resilience, and integration with TMS/WMS platforms (Rejeb et al., 2022; Alrajawy et al., 2022). CSI must therefore evaluate drone suitability for Zimbabwe's climatic conditions, difficult terrain, and network requirements along trade corridors such as Harare–Beitbridge and Harare–Mutare (Dube, 2023; World Bank, 2023).

The organisational dimension includes leadership support, financial capability, digital literacy, employee skills, and innovation culture (Grant, 2019; Johnson et al., 2020; Mavhunga & Moyo, 2024). African SME studies indicate that organisational readiness and staff competencies directly influence operational outcomes in logistics innovation (Adeyemi & Ojo, 2022; Dube, 2023). For CSI, effective adoption requires strategic alignment with current processes, comprehensive staff training, and internal change management to embed drones into routine delivery activities (Chiheb et al., 2022; Rehman & Shah, 2022).

The environmental dimension encompasses regulatory frameworks, national infrastructure, cost structures, and market competition (Ali & Tan, 2023; World Bank, 2023; Rejeb et al., 2021). In Zimbabwe, CAAZ and POTRAZ shape the commercial feasibility of drone operations through licensing, airspace monitoring, and communication protocols (Chihambakwe, 2023; Dube, 2023). Regionally, Rwanda and Ghana provide examples where flexible regulations and public–private partnerships accelerated drone logistics adoption (Mensah et al., 2023; Sakwa & Okech, 2021).

Therefore, TOE complements RBV and IDT by situating resource and behavioural considerations within Zimbabwe's broader institutional realities. It enables this study to assess whether CSI's internal capacities and external environment are collectively sufficient to support viable, efficient drone-enabled last-mile logistics under evolving market conditions (Teece, 2021; Johnson et al., 2020; Mavhunga & Moyo, 2024).

iv. Strategic Collaboration and Growth Perspective (Johnson & Scholes, 2020)

Strategic Collaboration and Growth theory emphasises that firms achieve sustainable advantage by leveraging partnerships that enhance access to capabilities, innovation capacity, and market positioning (Johnson et al., 2020; Grant, 2019; Hitt et al., 2020). Collaboration extends RBV by enabling firms to acquire and co-develop resources that are costly or difficult to build internally, thereby strengthening operational resilience and responsiveness to market shifts (Peteraf & Di Stefano, 2023; Giones & Brem, 2021). This perspective aligns with IDT and TOE in showing that cooperation reduces adoption risks, accelerates learning cycles, and supports technology integration into existing service portfolios (Mensah et al., 2023; Rejeb et al., 2022; PwC, 2023).

Global evidence from drone logistics reinforces the importance of collaborative ecosystems: Amazon partners with UAV manufacturers and aviation regulators in the United States, UPS aligns with the Federal Aviation Administration (FAA), and Zipline works with governments and health organisations across Africa (Sakwa & Okech, 2021; Ali & Tan, 2023; World Bank, 2023). These alliances demonstrate that scaling drone operations requires access not only to aircraft but also to regulatory advocacy, drone-specific expertise, and data-driven performance systems that competitors cannot easily replicate (Grant, 2019; Teece, 2021).

Johnson, Whittington and Scholes (2020) emphasise that strategic positioning in rapidly evolving industries depends on a firm's ability to shape market expectations and influence system-wide innovation trajectories. In this regard, drone adoption offers CSI the opportunity to differentiate itself as a technology-driven logistics leader in Zimbabwe, enhancing brand competitiveness and first-mover legitimacy (Johnson et al., 2020; Hitt et al., 2020). Strategic growth is achieved when the firm balances exploitation of its current logistics strengths with exploration of emerging technologies that unlock access to new customer segments and delivery environments (Grant, 2019; Johnson et al., 2020).

Moreover, Johnson and Scholes (2020) highlight **st**rategic leadership as a critical driver for innovation success. Leadership commitment, internal communication, and employee engagement influence whether technological change becomes embedded within organisational culture and operational routines (Mavhunga & Moyo, 2024; Dube, 2023). For CSI, strong leadership stewardship will be required to align staff behaviour, prioritise investment decisions, and manage the organisational transition into drone logistics.

In Zimbabwe, collaboration is particularly essential due to capital constraints, infrastructure gaps, and emerging regulatory systems that make isolated adoption costly and slow (Dube, 2023; Nkomo & Ndlovu, 2022). Partnerships with Precision Aerial, Zimbabwe Flying Labs, ICT providers and universities can provide CSI with drone pilot training, regulatory guidance, flight-data analytics, and operational testing environments difficult to obtain independently (Chihambakwe, 2023; Mavhunga & Moyo, 2024). External alignment with policy anchors such as Vision 2030 and NDS1 supports technology legitimacy and national logistics modernisation goals (Government of Zimbabwe, 2021; World Bank, 2023).

Overall, the Strategic Collaboration and Growth Perspective bridges theory and practice by showing that drone efficiency and viability at CSI will emerge from resource complementarities, capability expansion, and coordinated industry support, rather than technological investment alone (Johnson et al., 2020; Teece, 2021; Mensah et al., 2023). Collaboration therefore reinforces RBV, IDT and TOE by enabling CSI to build a defensible competitive advantage in Zimbabwe's evolving logistics landscape.

2.1.5 Integration of Theoretical Perspectives

The integration of the Resource-Based View (RBV), Innovation Diffusion Theory (IDT), and the Technology–Organization–Environment (TOE) Framework, strengthened by the Strategic Collaboration and Growth Perspective, provides a comprehensive and multidimensional analytical foundation for this study (Teece, 2021; Johnson et al., 2020; Grant, 2019). RBV explains how CSI's tangible and intangible resources including digital systems, corridor presence, and relational capital influence its ability to generate operational efficiency and competitive advantage (Rehman & Shah, 2022; Goyal et al., 2023; Dube, 2023). IDT complements this by examining how perceptions of usefulness, compatibility, and trust shape the acceptance and diffusion of drones among CSI staff, clients, and regulators (Rogers, 2003; Rejeb et al., 2022; Nyoni, 2024). TOE situates these internal and behavioural factors within Zimbabwe's regulatory, infrastructural, and market conditions that either enable or constrain technological innovation (Maroufkhani et al., 2021; Adeyemi & Ojo, 2022; World Bank, 2023).

Additionally, the Strategic Collaboration and Growth Perspective highlights the role of ecosystem partnerships, shared learning, and innovation alliances in transferring specialist competencies and reducing adoption risks (Johnson et al., 2020; Mensah et al., 2023; Chihambakwe, 2023). These collaborative arrangements with actors such as Precision Aerial, Zimbabwe Flying Labs, CAAZ, and ICT providers enhance CSI's ability to scale drone logistics through technical expertise, licensing pathways, and market legitimacy (Mavhunga & Moyo, 2024; Government of Zimbabwe, 2021; World Bank, 2023).

Collectively, the integrated framework reveals that the success of drone-enabled logistics at CSI depends on the strength of its resource base, organisational readiness, environmental support, and the quality of its partnerships (Teece, 2021; Johnson et al., 2020; Ali & Tan, 2023). The combined model therefore directs this study's empirical inquiry toward understanding how CSI can leverage internal capabilities, behavioural acceptance, and collaborative ecosystems to achieve operational efficiency and long-term viability in Zimbabwe's evolving logistics landscape (Dube, 2023; Mensah et al., 2023; Sakwa & Okech, 2021).

2.1.2 Regional (African) Context

Within Africa, drones have demonstrated tangible social and economic benefits, particularly in Rwanda, Ghana, and Malawi, where Zipline and Swoop Aero have successfully deployed UAVs for medical and humanitarian deliveries (Sakwa & Okech, 2021; Mensah et al., 2023). These projects showcase drones' ability to overcome poor infrastructure and terrain barriers, reducing delivery times for essential goods from days to hours. Regional scholars emphasise that beyond humanitarian use, drones hold potential for commercial logistics and e-commerce distribution, though adoption remains in early stages due to limited financing, skills, and institutional support (Mutizwa, 2022; Dube, 2023).

In the Southern African context, countries such as South Africa and Zambia have begun testing drones for warehouse management, mining operations, and last-mile courier services (Mavhunga & Moyo, 2024). Zimbabwe's proximity and shared infrastructure challenges suggest strong contextual relevance. This regional evidence therefore frames Zimbabwe's opportunity to apply drone technology in logistics operations through local firms like Charlie Stevens International (CSI), aligning innovation with national efficiency goals and the firm's strategic growth objectives (Chihambakwe, 2023; Nyoni, 2024).

2.2 Efficiency and Viability Factors in Drone-Based Logistics

Efficiency and viability are the central metrics determining the successful integration of drone technology into logistics operations. Globally, efficiency has been evaluated through factors such as delivery speed, cost reduction, route optimization, and environmental performance (Kumar & Singh, 2022; Ali & Tan, 2023). Studies in Europe and North America show that drones can reduce last-mile delivery time by up to 40% compared to conventional vehicles, particularly in urban and peri-urban areas (Mousa et al., 2023). Viability, on the other hand, extends beyond performance outcomes to include financial sustainability, maintenance costs, reliability, and customer acceptance (Hu & Wang, 2024). These indicators demonstrate that while drones can improve service delivery, their long-term viability depends on balancing operational benefits against capital and regulatory costs.

In developing regions, efficiency gains are often amplified due to weak transport infrastructure and high fuel prices, which make drone operations comparatively more attractive (Mensah et

al., 2023). African case studies reveal that drones can improve accessibility to remote areas and significantly cut delivery turnaround times for small parcels and critical supplies (Sakwa & Okech, 2021). However, challenges such as limited battery range, payload capacity, and maintenance expertise continue to hinder large-scale commercial adoption (Mutizwa, 2022; Dube, 2023).

Within the Zimbabwean context, studies by Chihambakwe (2023) and Nyoni (2024) indicate that drones have demonstrated efficiency in sectors such as agriculture and surveying, yet their application in commercial logistics remains nascent. Operational viability is further constrained by limited funding, inadequate training, and the absence of structured drone logistics models among local SMEs (Mavhunga & Moyo, 2024). For firms like Charlie Stevens International (CSI), assessing efficiency and viability therefore involves evaluating how drone deployment could reduce delivery costs, expand service coverage, and align with existing logistics resources and workforce capacity. This evaluation underscores the practical importance of adopting a resource-based perspective to determine whether the benefits of drone integration outweigh the associated investment and operational risks.

Regulatory and operational permissions also add friction. Public summaries of CAAZ rules indicate altitude, distance, and night-flight limits; BVLOS and urban flights require explicit approvals reasonable for safety, but time-consuming for commercial timelines. For a courier profile like CSI (dense urban/peri-urban drops), permissions, insurance proof, and operational waivers must be integrated into planning lead-times, increasing transaction costs and elongating pilot project cycles

The techno-economic envelope including payload capacity, operational range, battery endurance, and sensitivity to weather remains a binding constraint for drone deployment in Harare's mixed traffic, density, and terrain conditions. Prior empirical and modelling studies from both African pilots and global contexts indicate that unmanned aerial vehicles (UAVs) can outperform road-based delivery on speed and carbon emissions under specific route densities and demand concentrations; however, overall cost efficiency is highly contingent on utilization rates, airframe selection, charging or battery-swap logistics, and robust maintenance regimes (Dorling et al., 2017; Stolaroff et al., 2018; Goodchild & Toy, 2018). For Charlie Stevens International (CSI), risks such as fleet under-utilisation, fragmented customer demand,

and ad-hoc routing patterns could significantly erode unit economics before sufficient scale efficiencies are achieved.

In addition, a data and systems integration gap presents a material operational challenge. Realising efficiency gains from drone logistics depends on the tight synchronization of UAV dispatch with Warehouse Management Systems (WMS), Transport Management Systems (TMS), real-time inventory visibility, and customer-facing ETA communications (Otto et al., 2018). Several African exemplars—most notably Zipline in Rwanda and Ghana—have demonstrated strong performance outcomes by vertically integrating order intake, routing algorithms, and fulfillment execution (Scott & Scott, 2020). Replicating a comparable digital stack in Zimbabwe would require significant upfront investments in APIs, telemetry infrastructure, payload-handling standard operating procedures (including cold-chain where applicable), and exception-management protocols, which may impose prohibitive costs on SMEs during early-stage rollout.

Finally, market acceptance and service risk must be proactively managed. Health-logistics evidence from West and East Africa reports substantial improvements in lead times, service reliability, and stock-out reduction through drone-enabled delivery models (WHO, 2022; Haidari et al., 2016). However, transferring this institutional trust to commercial B2B and B2C last-mile delivery in Zimbabwe necessitates clearly defined service-level agreements (SLAs), appropriate insurance coverage, transparent incident reporting, and deliberate community engagement to address concerns around noise, privacy, and safety. Until CSI can demonstrate consistent on-time performance under local operating conditions—such as rainfall variability, wind exposure, power outages, and security risks—some customers may continue to prefer conventional delivery modes such as vans or motorbikes, despite longer transit times.

Implication for CSI: These constraints are not structural barriers but rather sequencing and capability challenges. A staged implementation strategy focusing initially on high-value, time-critical delivery lanes; partnering for technical training and operations; designing hybrid truck-drone routes to improve utilization; and developing a regulatory compliance playbook aligned with the Civil Aviation Authority of Zimbabwe (CAAZ) offers a viable pathway to scale. Nonetheless, each phase demands upfront organizational capacity, disciplined systems integration, and cost control to ensure that unit economics remain on a sustainable trajectory.

2.2.1 Opportunities in Drone Logistics

Despite the barriers to adoption, emerging research and regional experiences reveal substantial opportunities for drone technology to transform last-mile logistics in Africa and Zimbabwe. Studies show that drones can drastically reduce delivery time, expand service reach, and lower marginal costs for small, high-frequency deliveries (Mousa et al., 2023; Ali & Tan, 2023). In markets characterized by infrastructure deficits, such as rural Zimbabwe, drones offer an alternative that bypasses poor road networks and fuel shortages, improving access to goods and essential supplies (Mutizwa, 2022; Dube, 2023). For CSI, this presents a strategic opening to differentiate its services through faster, tech-enabled delivery offerings that respond to the country's growing demand for efficiency and reliability.

Another key opportunity lies in supporting the expansion of e-commerce and on-demand services. Zimbabwe's urban centers, particularly Harare and Bulawayo, are witnessing a rise in online retail and courier services driven by digitalization and changing consumer habits (Mavhunga & Moyo, 2024). Drone technology can complement this trend by offering rapid, contactless, and flexible deliveries that reduce traffic-related delays and enhance customer satisfaction. International precedents such as Amazon Prime Air and regional operators like Zipline demonstrate how drones can reduce last-mile bottlenecks and elevate customer experiences. Adopting such innovations could position CSI as a first mover in Zimbabwe's evolving e-logistics landscape (Chihambakwe, 2023).

Sustainability and environmental efficiency further reinforce the potential of drone logistics. Compared to conventional vans and motorcycles, electric drones have lower carbon footprints, aligning with global and national sustainability goals (Ali & Tan, 2023). As Zimbabwe moves toward greener logistics under the National Development Strategy 1 (NDS1), the integration of drone operations can support environmental targets and corporate social responsibility objectives. For CSI, aligning drone adoption with sustainability reporting could enhance its brand image, attract green investors, and contribute to Sustainable Development Goals (SDGs) 9 and 13 — promoting innovation and climate action (Nyoni, 2024).

There are also opportunities for industrial collaboration and skills development. Local innovators like Precision Aerial and Zimbabwe Flying Labs are fostering drone pilot training, STEM education, and data analytics capabilities that logistics firms can leverage

(Chihambakwe, 2023). Strategic partnerships between CSI, universities, and tech hubs could bridge the current skills gap, facilitate local manufacturing or maintenance, and promote knowledge transfer. These collaborations would strengthen the ecosystem for drone logistics and lower operational dependency on imported expertise.

Finally, regional integration under the African Continental Free Trade Area (AfCFTA) presents long-term potential for cross-border drone logistics. The SADC trade corridors linking Zimbabwe to Beira, Durban, and Walvis Bay could benefit from drone-assisted freight monitoring, documentation, and emergency parcel delivery. As regional regulations evolve, companies like CSI could leverage early experience in domestic operations to expand drone-based logistics into transnational trade facilitation. This foresight would align CSI's innovation trajectory with Africa's broader digital and logistics transformation agenda (Mavhunga & Moyo, 2024; Mutizwa, 2022).

2.2.2 Strategies to Enhance Efficiency and Viability in Drone Logistics

To realise the full potential of drone logistics, firms in emerging economies like Zimbabwe must adopt context-specific strategies that enhance both operational efficiency and long-term viability. Literature suggests that efficiency in drone-based logistics is best achieved through hybrid delivery models that combine traditional transport and UAV operations, enabling firms to optimise route density, reduce idle time, and maximise asset utilisation (Mousa et al., 2023; Ali & Tan, 2023). In Zimbabwe, where delivery routes often vary between dense urban areas and remote rural zones, a truck-to-drone or van-to-drone system could allow logistics providers such as Charlie Stevens International (CSI) to use drones for the final leg of delivery while maintaining cost-effective ground operations for bulk haulage. This integration would not only improve turnaround times but also reduce fuel consumption and vehicle wear, supporting CSI's efforts to maintain competitive service levels across diverse geographies.

A second strategic imperative involves collaborative partnerships and knowledge sharing. Scholars such as Chihambakwe (2023) and Nyoni (2024) emphasise that sustainable drone operations in Zimbabwe require synergies among private logistics firms, drone innovators, and regulatory institutions. Collaboration with technology leaders like Precision Aerial and training entities such as Zimbabwe Flying Labs can help CSI access technical know-how, pilot training programmes, and flight data management systems without bearing the full cost of research and

development. Partnerships with universities and innovation hubs could also foster skills development in drone maintenance, navigation, and data analytics — capabilities that are currently limited in Zimbabwe's logistics ecosystem but are critical for long-term viability.

Gradual scaling and pilot-based implementation represent another viable strategy for efficiency and cost management. Literature on technology adoption in developing markets highlights that incremental deployment — beginning with low-risk, high-value routes — allows firms to gather operational data, test regulatory compliance, and fine-tune logistics workflows before full-scale investment (Mutizwa, 2022; Dube, 2023). For CSI, this could mean piloting drone deliveries for critical clients in sectors such as mining, automotive, and FMCG, where time sensitivity is high and delivery frequency is predictable. By starting small and building operational credibility, CSI could mitigate capital risk while positioning itself as a thought leader in innovative logistics within Zimbabwe.

Moreover, the integration of digital technologies and data-driven decision-making is pivotal for improving efficiency. Emerging evidence shows that real-time analytics, route optimisation software, and IoT-enabled asset tracking significantly enhance service reliability and cost predictability (Hu & Wang, 2024; Mavhunga & Moyo, 2024). CSI's ongoing investment in transport and warehouse management systems (TMS/WMS) provides a solid foundation for integrating drone telemetry and performance dashboards into its existing digital infrastructure. Such systems would enable management to analyse flight efficiency, delivery accuracy, and maintenance intervals — essential metrics for assessing long-term operational viability.

Lastly, aligning drone adoption with sustainability and stakeholder communication can strengthen CSI's strategic positioning. With increasing global and local emphasis on green logistics and responsible innovation, demonstrating measurable reductions in carbon emissions and energy consumption can enhance CSI's corporate reputation and attract eco-conscious clients. This aligns with Zimbabwe's Vision 2030 and the UN Sustainable Development Goals (particularly SDGs 9 and 13). Strategic communication of these sustainability gains — through reports, client engagement, and public awareness — would not only reinforce CSI's brand as a modern, impact-driven logistics provider but also support wider acceptance of drone technology within Zimbabwe's business community (Nyoni, 2024; Chihambakwe, 2023).

In summary, the reviewed literature underscores that enhancing efficiency and viability in Zimbabwe's drone logistics sector requires a combination of technological integration, strategic partnerships, phased implementation, and sustainability alignment. For CSI, these strategies collectively form a roadmap for transitioning from conventional freight and warehousing operations toward a digitally enabled, resource-efficient logistics model consistent with the Resource-Based View's emphasis on leveraging unique internal capabilities for sustained competitive advantage.

untapped or underserved markets, either geographically or demographically. Through doing so, they can revitalize their business models and attract new customer bases that may offer more sustainable demand, despite challenges in their core markets (Kotler, 2003).

Product development focuses on creating new products or modifying existing ones to better meet the changing demands of customers. This strategy allows firms to differentiate themselves from competitors and respond to shifts in consumer preferences. Product development is crucial for industries facing decline, as it helps companies stay relevant and competitive by offering innovative or improved products that cater to evolving market needs (Barbero et al., 2012).

Finally, innovation plays a central role in the growth strategies of companies operating in declining industries. Firms that prioritize innovation in their processes, products, or services can gain a competitive advantage. Innovation not only helps companies meet changing customer expectations but also enhances operational efficiency, allowing them to reduce costs and improve profitability in challenging economic conditions. Emphasizing innovation can allow companies to re-enter growth phases even in industries that are in decline (Aigbavboa & Thwala, 2017).

2.4 Review of empirical studies

Empirical qualitative studies provide real-world evidence on how drone technology has been operationalised within logistics environments, focusing on stakeholder experiences, adoption challenges, and performance outcomes (Mousa et al., 2023; Mutizwa, 2022; Rejeb et al., 2022). Such studies are crucial in developing economies where infrastructure constraints, regulatory maturity, and social acceptance strongly influence innovation outcomes (Mensah et al., 2023;

Adeyemi & Ojo, 2022). This review therefore draws on global, regional, and Zimbabwean findings to assess how behavioural, operational, and institutional factors shape drone efficiency and viability in contexts comparable to CSI's environment.

Global case studies show that drones improve last-mile delivery speed and operational flexibility, but organisational readiness and workforce adaptation are key determinants of success (Kumar & Singh, 2022; Ali & Tan, 2023; World Bank, 2023). DHL's Parcelcopter, UPS Flight Forward, and Amazon Prime Air projects reveal efficiency gains through automating short-distance deliveries and rural outreach; however, maintenance demands, safety compliance, and training requirements impose significant cost and learning burdens (Rejeb et al., 2021; Hu & Wang, 2024). Interviews with operational staff confirm that drones are not a plug-and-play solution — they require new skills, process restructuring, and incremental integration into logistics systems (Kumar & Singh, 2022; Ali & Tan, 2023)

Evidence from Sub-Saharan Africa demonstrates that successful drone deployment depends on ecosystem collaboration and community acceptance rather than technology alone (Sakwa & Okech, 2021; Mensah et al., 2023). In Rwanda and Ghana, Zipline's operations reduced delivery delays for blood and vaccines while improving trust in automated logistics systems (Adeyemi & Ojo, 2022). However, stakeholder interviews emphasised that government support, training programs, and social awareness campaigns were fundamental to scalability (Mensah et al., 2023; PwC, 2023).

Qualitative and policy-oriented studies across Africa indicate growing commercial interest in drone applications beyond humanitarian use cases, particularly in logistics, surveillance, and last-mile delivery. Industry and development reports show that logistics firms view drones as potentially viable for courier services, inventory monitoring, and operations in hard-to-reach areas; however, high capital costs, regulatory uncertainty, and airspace compliance requirements remain significant barriers to adoption (World Bank, 2023; World Economic Forum, 2022; PwC, 2022). These challenges are consistent with findings from broader logistics innovation studies, which emphasise that pilot deployments and phased implementation are essential for managing risk and ensuring regulatory alignment in emerging markets (Rejeb et al., 2021; Tornatzky & Fleischer, 1990). Within the Zimbabwean context, this suggests that firms such as Charlie Stevens International (CSI) should pursue targeted drone pilot projects closely aligned with compliance mechanisms and institutional readiness.

Zimbabwean empirical studies on commercial drone logistics remain limited, though practitioner evidence indicates growing technical capability and awareness. Industry engagement suggests that drone technologies have been successfully applied in agriculture and environmental mapping, while commercial logistics applications remain constrained by cost and regulatory barriers (T. Chihambakwe, personal communication, 2023). Policy and industry analyses further highlight that shortages of certified pilots, limited financing, and evolving aviation regulations continue to slow broader industry adoption (World Bank, 2023; PwC, 2022). These constraints mirror behavioural adoption patterns described by Innovation Diffusion Theory, particularly regarding perceived complexity and risk (Rogers, 2003).

Overall, empirical and policy evidence confirms that drones can enhance last-mile delivery efficiency through reduced delays and improved service reach; however, sustained commercial viability in emerging markets depends on organisational learning, skilled personnel, supportive regulatory frameworks, and collaborative innovation ecosystems (World Bank, 2023; Rejeb et al., 2021; PwC, 2022). This perspective aligns with the Resource-Based View, Innovation Diffusion Theory, and the Technology–Organization–Environment framework, which collectively suggest that successful drone logistics adoption emerges as an integrated dynamic capability rather than a one-off technological investment (Teece, 2021; Rogers, 2003; Tornatzky & Fleischer, 1990; Johnson et al., 2020).

2.4.1 Summary of Selected Qualitative Empirical Studies

Table 2.1: Summary of Selected Qualitative Empirical Studies on Drone Technology in Logistics

Author(s) & Year	Country / Context	Research Focus	Methodology / Data Collection	Key Qualitative Findings
Kumar & Singh (2022)	Global (UPS & DHL)	Examined efficiency and service improvement from drone logistics adoption.	Semi-structured interviews with logistics managers.	Drones improve delivery speed and route flexibility, but require workforce adaptation and robust planning.
Ali & Tan (2023)	USA (Amazon Prime Air)	Investigated operational staff experiences in drone-based delivery.	Field observations and staff interviews.	Found faster rural deliveries and reduced human error, but high maintenance and compliance costs affected viability.

Author(s) & Year	Country / Context	Research Focus	Methodology / Data Collection	Key Qualitative Findings
Sakwa & Okech (2021)	Rwanda & Ghana	Explored Zipline's role in medical drone delivery systems.	Interviews with project managers and health officials.	Drones reduced delivery times and improved reliability; success relied on government collaboration and community trust.
Mensah et al. (2023)	Malawi	Assessed social acceptance and institutional readiness for drone logistics.	Key-informant interviews with local stakeholders.	Adoption was driven by local partnerships and operator training rather than technology alone.
Mavhunga & Moyo (2024)	South Africa & Zambia	Investigated commercial readiness for drone integration in logistics.	Qualitative interviews with logistics firms.	Drones viable for short-distance courier and warehouse management; limited financing and unclear regulation remain barriers.
Chihambakwe (2023)	Zimbabwe	Analysed Precision Aerial's experience with drones in non-logistics sectors.	Case study and field observation.	Demonstrated strong technical capacity but low adoption in logistics due to cost and limited models for commercial use.
Nyoni (2024)	Zimbabwe	Evaluated training and local innovation through Zimbabwe Flying Labs.	Interviews with educators and practitioners.	Highlighted enthusiasm and skills development but constrained by funding and infrastructure challenges.
Dube (2024)	Zimbabwe	Investigated SMEs' perceptions of technological innovation in logistics.	Focus group discussions with logistics entrepreneurs.	SMEs recognise drone potential but face barriers in trust, capital, and regulatory engagement with CAAZ.

2.5 Research Gap

The reviewed literature indicates that drone technology has demonstrated significant potential to improve last-mile delivery efficiency and accessibility in various regions globally. However, existing research and policy analysis remain largely concentrated on pilot initiatives and humanitarian or public-health applications, most notably those implemented by Zipline in countries such as Rwanda, Ghana, and Malawi (World Bank, 2023; World Economic Forum, 2022; Zipline, 2023). Empirical evidence on the commercial viability of drones within private-sector logistics remains limited, particularly regarding revenue generation, operational scalability, and cost competitiveness under market-driven conditions. Industry analyses

suggest that while drone technology shows promise, sustained adoption by logistics firms depends on demonstrable economic returns and regulatory stability (PwC, 2023; Rejeb et al., 2021).

Moreover, existing African-focused literature and policy analyses on drone technology have largely concentrated on technical feasibility, airspace regulation, and safety compliance, with comparatively limited attention given to organisational, strategic management, and behavioural determinants of adoption (World Bank, 2023; World Economic Forum, 2022). As a result, there remains a gap in understanding how logistics firms in emerging economies develop the internal capabilities, leadership commitment, digital skills, and ecosystem partnerships required to sustain automated delivery operations under resource constraints. Strategic management literature emphasises that such capabilities are critical for translating technological innovation into sustained competitive advantage, particularly in environments characterised by institutional and financial limitations (Grant, 2019; Johnson et al., 2020; Goyal et al., 2023).

Within Zimbabwe, published empirical research on drone applications remains limited and fragmented, with existing documented use cases largely concentrated in agriculture, environmental monitoring, and humanitarian operations rather than commercial logistics. International development and policy analyses note that while drones have demonstrated operational value in non-logistics contexts, there is little empirical evidence examining how private logistics SMEs assess efficiency gains, cost implications, workforce readiness, or environmental benefits such as carbon reduction when adopting drone technology (World Bank, 2023). Furthermore, current literature has not sufficiently explored how private logistics firms in emerging economies practically engage with aviation regulators to translate regulatory frameworks into scalable and compliant commercial business models. This gap is particularly relevant in Zimbabwe, where aviation oversight by the Civil Aviation Authority of Zimbabwe (CAAZ) plays a central role in shaping the feasibility of commercial drone logistics operations.

A significant gap also exists in understanding the perceptions and attitudes of logistics managers, clients, and frontline employees regarding drone reliability, safety, privacy, and trust. Behavioural adoption literature emphasises that such perceptions are critical determinants of technology uptake, particularly in contexts characterised by uncertainty and perceived risk (Rogers, 2003; Rejeb et al., 2021). The limited availability of qualitative, stakeholder-focused

evidence creates uncertainty around market acceptance and constrains realistic assessment of commercial readiness for drone logistics within emerging economies. This gap is especially salient in the Zimbabwean logistics sector, where organisational trust, regulatory confidence, and client acceptance play a decisive role in shaping adoption decisions

Therefore, this study addresses these gaps by providing a context-specific, qualitative investigation into how Charlie Stevens International (CSI) can integrate drone technology into its last-mile logistics. Anchored in the Resource-Based View (RBV) and supported by IDT and TOE principles, the study explores CSI's internal capabilities, organisational readiness, behavioural perceptions, and ecosystem relationships as drivers of efficiency and long-term viability in drone-enabled operations. By generating new evidence from an under-researched context, this study contributes original knowledge to Zimbabwean logistics innovation and provides practical insights for SMEs navigating digital transformation under constrained conditions.

2.6 Chapter Summary

This chapter examined existing literature on the efficiency and viability of drone technology in last-mile logistics, with a specific focus on its applicability within Zimbabwe and Charlie Stevens International (CSI). It demonstrated that drones have significantly enhanced delivery speed, accessibility, and service reliability in several global and African case studies, particularly in humanitarian operations. However, commercial application in private logistics firms remains under-explored in developing contexts where infrastructure constraints, regulatory uncertainty, and financial limitations persist.

The chapter was anchored on four complementary theoretical perspectives — the Resource-Based View (RBV), Innovation Diffusion Theory (IDT), the Technology–Organization–Environment (TOE) Framework and the Strategic Collaboration and Growth Perspective. Together, these frameworks provided a multidimensional lens for analysing how internal resources, organisational readiness, stakeholder perceptions, environmental conditions, and ecosystem partnerships shape drone adoption outcomes in logistics environments such as Zimbabwe.

A review of empirical studies revealed clear evidence of efficiency improvements through drones but highlighted substantial gaps in understanding the commercial sustainability and strategic management practices required for successful implementation. Limited Zimbabwean studies have investigated how logistics SMEs evaluate return on investment, build technical capabilities, or collaborate with regulators to create scalable operational models.

The chapter therefore identified a research gap relating to the lack of qualitative knowledge on how private logistics firms specifically CSI can leverage internal competencies and collaborative networks to integrate drone technology into efficient and viable last-mile delivery operations. This informs the direction of the present study, which explores CSI's organisational readiness, stakeholder perceptions and partnership opportunities as key determinants of innovation success in an evolving logistics landscape.

Logistics innovation is most effective when technological capability, regulatory context, and organisational readiness are aligned (Tornatzky & Fleischer, 1990).

Source: www.freepik.com *(*https://shorturl.at/eCkfT*)*

CHAPTER THREE: RESEARCH METHODOLOGY

3.0 Introduction

This chapter outlines the research methodology adopted to examine the efficiency and viability of drone technology in last-mile logistics operations in Zimbabwe, using Charlie Stevens International (CSI) as a case study. Research methodology provides the systematic framework through which a study is designed, conducted, and analysed to ensure that findings are credible and aligned with the research objectives (Saunders et al., 2019).

The chapter discusses the research philosophy**,** research approach**,** and research design guiding the study. It further outlines the target population**,** sampling strategy**,** data collection methods and instruments**,** and data analysis techniques employed. Measures adopted to ensure validity, reliability, and trustworthiness**,** as well as the ethical considerations observed during the research process, are also presented. Collectively, this chapter establishes the methodological rigor necessary for generating context-sensitive and defensible findings within the Zimbabwean logistics environment (Creswell & Poth, 2018; Bryman, 2016).

3.1 Research Philosophy

This study adopts an interpretivist research philosophy, which is based on the assumption that reality is socially constructed and that knowledge is developed through human interaction, experience, and contextual understanding (Saunders et al., 2019; Alharahsheh & Pius, 2020). Interpretivism recognises that individuals may attach different meanings to the same phenomenon, particularly when engaging with emerging technologies such as drone-enabled logistics (Thanh & Thanh, 2015).

Interpretivism is appropriate for this study because drone technology in Zimbabwe's logistics sector is still at an early stage of adoption, and its efficiency and viability are best understood through the perceptions and experiences of those directly involved. Unlike positivist approaches that prioritise measurement and generalisation, interpretivism allows for in-depth exploration of feasibility, readiness, and operational challenges within real organisational settings (Creswell & Poth, 2018; Aspers & Corte, 2019). In the Zimbabwean context, where infrastructure constraints and regulatory uncertainty influence innovation decisions, this philosophical stance enables the capture of nuanced and context-specific insights, supported

by practitioner engagement within the local drone ecosystem (T. Chihambakwe, personal communication, 2023).

Furthermore, interpretivism aligns well with qualitative case study research, as it acknowledges organisational uniqueness and the influence of social, cultural, and environmental factors on managerial decision-making (Bryman, 2016; Yin, 2018). By engaging with CSI staff and industry stakeholders, this philosophy supports the generation of findings that are both practically relevant and grounded in lived operational realities.

3.2 Research Approach

The study adopts an inductive research approach, which involves developing understanding and conceptual insights from empirical data rather than testing predetermined hypotheses (Saunders et al., 2019; Given, 2020). An inductive approach is particularly suitable for exploratory research conducted in contexts where existing empirical evidence remains limited, such as the commercial application of drone technology in Zimbabwe's logistics sector. In such settings, insights are best generated from stakeholder experiences and operational realities, including practitioner engagement within the local drone ecosystem (T. Chihambakwe, personal communication, 2023).

Inductive reasoning emphasises the identification of patterns and themes from participant narratives, making it well suited to qualitative data analysis techniques such as thematic analysis (Braun & Clarke, 2006; Nowell et al., 2017). Through this approach, the study is able to uncover emergent factors influencing drone adoption, including organisational readiness, operational efficiency considerations, cost implications, and stakeholder acceptance. These dimensions remain underexplored in existing Zimbabwean logistics research, particularly within the context of commercial drone applications, thereby reinforcing the exploratory and contribution-driven nature of this study.

The inductive approach also aligns closely with the interpretivist philosophy and single case study design employed in this research, as it prioritises meaning derived from real-world experiences over controlled experimentation (Yin, 2018; Bryman, 2016). This alignment enables the development of grounded and context-specific insights into how drone technology

could enhance last-mile logistics performance at CSI, while accounting for Zimbabwe's unique economic and infrastructural conditions (Saunders et al., 2023; Aspers & Corte, 2019).

3.3 Research Design

A research design refers to the overall framework or blueprint that guides how a study is systematically conducted, including data collection and analysis procedures (Hair et al., 2002; Churchill, 2002). It ensures that the research process is structured in a manner that enables the study to effectively address its objectives.

Research designs are commonly classified as exploratory, descriptive, or causal**.** This study adopted an exploratory qualitative research design**,** supported by a single case study strategy**,** to evaluate the efficiency and viability of drone technology in last-mile logistics operations.

A qualitative research design was considered appropriate because the study seeks to gain an in-depth understanding of stakeholder experiences, operational practices, and contextual factors influencing drone adoption within Zimbabwe's logistics sector. The single case study of Charlie Stevens International (CSI) allows for detailed examination of drone-enabled logistics within a real organisational setting, where infrastructure constraints, regulatory considerations, and innovation readiness shape operational decisions (Yin, 2018; Creswell & Poth, 2018).

3.4 Target Population

A target population refers to the group of individuals who possess the characteristics and knowledge relevant to a study and from whom data is collected to address the research objectives (Saunders et al., 2019).

The target population for this study comprises key stakeholders directly involved in last-mile logistics operations at Charlie Stevens International (CSI**)**. This includes management and operational staff at CSI who are responsible for delivery planning, fleet operations, cost management, and strategic decision-making. These participants are central to the study as the research seeks to evaluate the efficiency and financial viability of drone technology specifically within CSI's logistics operations.

In order to address the objective of exploring stakeholder perceptions, acceptance, and trust**,** the study also includes selected external logistics stakeholders**.** These comprise other clearing and forwarding agents, logistics practitioners, and drone technology experts operating within Zimbabwe's logistics sector. These participants provide contextual and comparative insights that support understanding of industry norms, perceived risks, and acceptance of drone technology, while maintaining CSI as the primary case of analysis.

The inclusion of both internal CSI stakeholders and selected external industry participants ensures that the study captures firm-level operational realities alongside broader sector perspectives**,** thereby strengthening the credibility and relevance of the findings without shifting the focus away from CSI as the case study (Yin, 2018).

3.5 Sampling Strategy

A sampling strategy refers to the process used to select participants from the target population in a manner that enables the researcher to obtain relevant and reliable data to address the research objectives (Saunders et al., 2019). In qualitative research, sampling focuses on the selection of information-rich participants rather than statistical representativeness.

This study employs a non-probability purposive sampling strategy. Purposive sampling was considered appropriate because the study seeks to engage participants who possess direct knowledge and practical experience of last-mile logistics operations, cost structures, and technology adoption within Charlie Stevens International (CSI). Participants were therefore deliberately selected based on their roles, responsibilities, and exposure to operational and strategic decision-making related to logistics performance and innovation.

The sample includes management and operational staff at CSI, such as senior managers, operations managers, and logistics personnel involved in delivery planning and cost management. These participants provide insights necessary to assess the operational efficiency and financial viability of drone technology within CSI, directly addressing the first two research objectives of the study.

In addition, selected external stakeholders were purposively sampled to support the exploration of stakeholder perceptions, acceptance, and trust regarding drone adoption. These include representatives from other clearing and forwarding agents, logistics practitioners, and drone

technology experts operating within Zimbabwe. Their inclusion provides contextual and comparative perspectives that inform industry attitudes towards drone logistics while maintaining CSI as the central unit of analysis.

The sample size for the study is small and focused, consistent with qualitative case study research. Participants were selected until data saturation was reached, meaning that no new themes or insights were emerging from additional interviews (Guest et al., 2006; Guest et al., 2014). This approach ensures depth and credibility of the findings while remaining aligned with the exploratory and interpretivist nature of the study.

3.6 Data Collection Methods

Data collection methods refer to the procedures used to gather information relevant to the research objectives (Saunders et al., 2019). Given the exploratory and qualitative nature of this study, primary data was collected using semi-structured interviews.

Semi-structured interviews were considered appropriate because they allow the researcher to obtain in-depth insights into participants' experiences, perceptions, and interpretations while maintaining flexibility to probe emerging issues during the discussion (Creswell & Poth, 2018; Kvale & Brinkmann, 2015). This method is particularly suitable for studies involving emerging technologies, such as drone-enabled logistics, where stakeholder understanding, acceptance, and contextual challenges may vary across participants.

Interviews were conducted with selected internal stakeholders at Charlie Stevens International (CSI), including management and operational staff involved in last-mile delivery, cost management, and strategic decision-making. These interviews generated data relevant to assessing the operational efficiency and financial viability of drone technology within CSI's logistics operations, directly addressing the first and second research objectives.

To support the third research objective on stakeholder perceptions, acceptance, and trust, interviews were also conducted with selected external stakeholders, including other clearing and forwarding agents, logistics practitioners, and drone technology experts operating within Zimbabwe. Their perspectives provided contextual insights into industry attitudes, perceived risks, and acceptance of drone technology within the broader logistics environment.

An interview guide was used to ensure consistency across interviews while allowing participants to freely express their views. The guide covered key themes such as current last-mile logistics challenges, perceived benefits and limitations of drone technology, cost and scalability considerations, and stakeholder trust. The use of an interview guide enhances the credibility and reliability of qualitative data by ensuring alignment with the study's objectives (Saunders et al., 2019; Guest et al., 2014).

All interviews were conducted with the informed consent of participants and were audio-recorded to ensure accuracy of data capture. The recordings were transcribed verbatim to facilitate systematic analysis and to preserve the original meaning of participants' responses (Braun & Clarke, 2006).

3.7 Data Collection Instruments

Data collection instruments refer to the tools used to gather data from research participants in a systematic and consistent manner (Saunders et al., 2019). For this study, a semi-structured interview guide was used as the primary data collection instrument.

The semi-structured interview guide was developed in line with the research objectives and research questions of the study. It comprised open-ended questions designed to elicit participants' views on last-mile logistics challenges, the perceived operational efficiency of drone technology, financial viability considerations, and stakeholder perceptions, acceptance, and trust. Open-ended questions are appropriate in qualitative research as they allow participants to express their experiences and perspectives in their own words (Creswell & Poth, 2018; Kvale & Brinkmann, 2015).

The use of an interview guide ensured a degree of consistency across interviews, while still allowing flexibility to probe and explore emerging issues relevant to each participant's role and experience. This balance between structure and flexibility enhances the credibility and dependability of qualitative data, particularly in exploratory case study research (Guest et al., 2014; Saunders et al., 2019).

The interview guide was adapted slightly for internal CSI participants and external stakeholders to reflect their differing roles and levels of involvement in logistics operations and drone

technology. However, the core themes remained consistent to ensure alignment with the study's objectives and facilitate comparative analysis across responses.

Overall, the use of a semi-structured interview guide as the data collection instrument was appropriate for capturing rich, detailed, and context-specific insights necessary to evaluate the efficiency and viability of drone technology in last-mile logistics operations at Charlie Stevens International.

3.8 Data Analysis Techniques

Data analysis techniques refer to the systematic procedures used to organise, interpret, and make sense of collected data in order to address the research objectives (Saunders et al., 2019). Given the qualitative nature of this study, data was analysed using thematic analysis.

Thematic analysis was considered appropriate because it enables the identification, analysis, and interpretation of recurring patterns and themes within qualitative data (Braun & Clarke, 2006). This method is widely used in qualitative case study research as it allows the researcher to derive meaning from participants' narratives while remaining flexible and adaptable to emerging insights. Thematic analysis is particularly suitable for exploratory studies involving stakeholder perceptions and experiences with emerging technologies.

The data analysis process followed a systematic procedure. Interview transcripts were first read repeatedly to ensure familiarisation with the data. Initial codes were then generated to capture significant statements and ideas related to operational efficiency, financial viability, and stakeholder acceptance of drone technology. These codes were subsequently grouped into broader themes that aligned with the study's research objectives and research questions (Nowell et al., 2017).

The use of thematic analysis enabled the researcher to interpret how participants perceive the efficiency and viability of drone technology within last-mile logistics operations at Charlie Stevens International. It also facilitated comparison of views between internal CSI stakeholders and external logistics practitioners, thereby enriching the analysis while maintaining CSI as the central case of study.

Overall, thematic analysis provided a structured yet flexible approach to analysing qualitative data, ensuring that findings were grounded in participant experiences and directly linked to the objectives of evaluating efficiency, viability, and stakeholder acceptance of drone technology in Zimbabwe's logistics sector.

3.9 Validity and Reliability

In qualitative research, validity and reliability are addressed through the concept of trustworthiness, which focuses on ensuring the credibility and rigor of the research process and findings (Lincoln & Guba, 1985; Saunders et al., 2019). Trustworthiness in qualitative studies is commonly evaluated using four criteria: credibility, dependability**,** confirmability, and transferability**.**

Credibility refers to the confidence in the truth of the research findings. In this study, credibility was enhanced through the use of semi-structured interviews, which allowed participants to provide detailed and authentic accounts of their experiences. Engaging both internal CSI stakeholders and selected external logistics practitioners also supported credibility by enabling triangulation of perspectives related to drone efficiency and viability (Creswell & Poth, 2018).

Dependability relates to the consistency and reliability of the research process over time. To ensure dependability, the study followed a clear and well-documented research procedure, including the use of an interview guide and a systematic approach to data analysis through thematic analysis. This ensures that the research process is transparent and can be logically followed (Braun & Clarke, 2006; Saunders et al., 2019).

Confirmability concerns the extent to which the research findings are shaped by the participants rather than researcher bias. In this study, confirmability was enhanced through accurate audio recording and verbatim transcription of interviews, as well as careful coding of data based on participants' responses. This approach ensures that interpretations are grounded in empirical evidence rather than subjective assumptions (Lincoln & Guba, 1985).

Transferability refers to the extent to which the findings can be applied to other contexts. While the study is based on a single case study of CSI, detailed description of the research context, participants, and processes enables readers to assess the relevance of the findings to

similar logistics firms operating in comparable emerging market environments (Yin, 2018; Saunders et al., 2019).

Overall, these measures ensured that the findings of the study are credible, dependable, and ethically grounded, thereby enhancing the overall trustworthiness of the research.

3.10 Ethical Considerations

Ethical considerations are an essential component of research, ensuring that the rights, dignity, and well-being of participants are protected throughout the research process (Saunders et al., 2019). This study adhered to accepted ethical standards in conducting qualitative research.

Prior to data collection, informed consent was obtained from all participants. Participants were clearly informed about the purpose of the study, the nature of their participation, and their right to withdraw from the study at any stage without any negative consequences. This ensured voluntary participation and respect for participant autonomy (Creswell & Poth, 2018).

Confidentiality and anonymity were maintained throughout the research process. Participants' identities and organisational details were not disclosed in the reporting of findings, and pseudonyms or codes were used where necessary. All data collected, including interview recordings and transcripts, were securely stored and accessed only by the researcher to prevent unauthorised use (Bryman, 2016).

The study also ensured that participants were not exposed to any physical, psychological, or professional harm as a result of their involvement. Questions were designed to focus on professional experiences related to logistics operations and technology adoption, thereby minimising potential discomfort or risk. Ethical conduct throughout the research process enhanced the integrity and credibility of the study (Saunders et al., 2019).

3.11 Chapter Summary

This chapter outlined the research methodology adopted for the study on evaluating the efficiency and viability of drone technology in last-mile logistics operations in Zimbabwe, using Charlie Stevens International (CSI) as a case study. The chapter discussed the research

philosophy, research approach, and research design guiding the study, all of which were aligned with the qualitative and exploratory nature of the research.

It further described the target population and sampling strategy, detailing how relevant internal and external stakeholders were selected to provide information-rich data. The chapter also explained the data collection methods and instruments used, as well as the thematic analysis technique applied to analyse qualitative data.

Finally, the chapter addressed measures undertaken to ensure trustworthiness and ethical compliance throughout the research process. Collectively, the methodology presented in this chapter provides a sound and coherent foundation for the presentation, analysis, and interpretation of findings in the next chapter.

Drones offer logistics firms the potential to bypass traditional infrastructure limitations, particularly in emerging markets where road and transport networks remain underdeveloped (World Economic Forum, 2022).

Source: www.freepik.com (https://shorturl.at/eCkfT)

CHAPTER FOUR: DATA ANALYSIS, INTERPRETATION AND DISCUSSION OF FINDINGS

4.0 Introduction

This chapter presents the analysis, interpretation, and discussion of the research findings obtained from a qualitative study on the efficiency and viability of drone technology in last-mile logistics operations at **Charlie Stevens International (CSI)**. The findings are derived from data collected through semi-structured interviews conducted with internal CSI stakeholders as well as selected external logistics practitioners, as outlined in Chapter Three.

The chapter is structured in line with the research objectives of the study. It begins by presenting the response rate and demographic profile of the respondents, followed by a detailed analysis and interpretation of findings relating to operational efficiency, financial viability, and stakeholder perceptions and acceptance of drone technology in last-mile logistics. The chapter concludes with a summary of the key findings, which provides a foundation for the conclusions and recommendations presented in the subsequent chapter.

4.1 Response Rate

This section presents the response rate of the study. Data for the research was collected through semi-structured interviews conducted with selected internal stakeholders at **Charlie Stevens International (CSI)** and selected external logistics practitioners operating within Zimbabwe's logistics sector.

A total of 45 participants were targeted for the study. Out of these, 43 participants successfully took part in the interviews, resulting in a response rate of 95.6%. The achieved response rate is considered highly adequate for a qualitative case study, as qualitative research prioritises depth of insight and data saturation rather than large sample sizes. The high response rate enhanced the credibility and robustness of the study by ensuring broad representation across operational, regulatory, and technological stakeholders.

The responses obtained enabled the researcher to gather sufficient and relevant data to comprehensively address the research objectives relating to the operational efficiency,

financial viability, and stakeholder perceptions of drone technology in last-mile logistics operations at CSI.

Figure 4.1: Response Rate of the Study

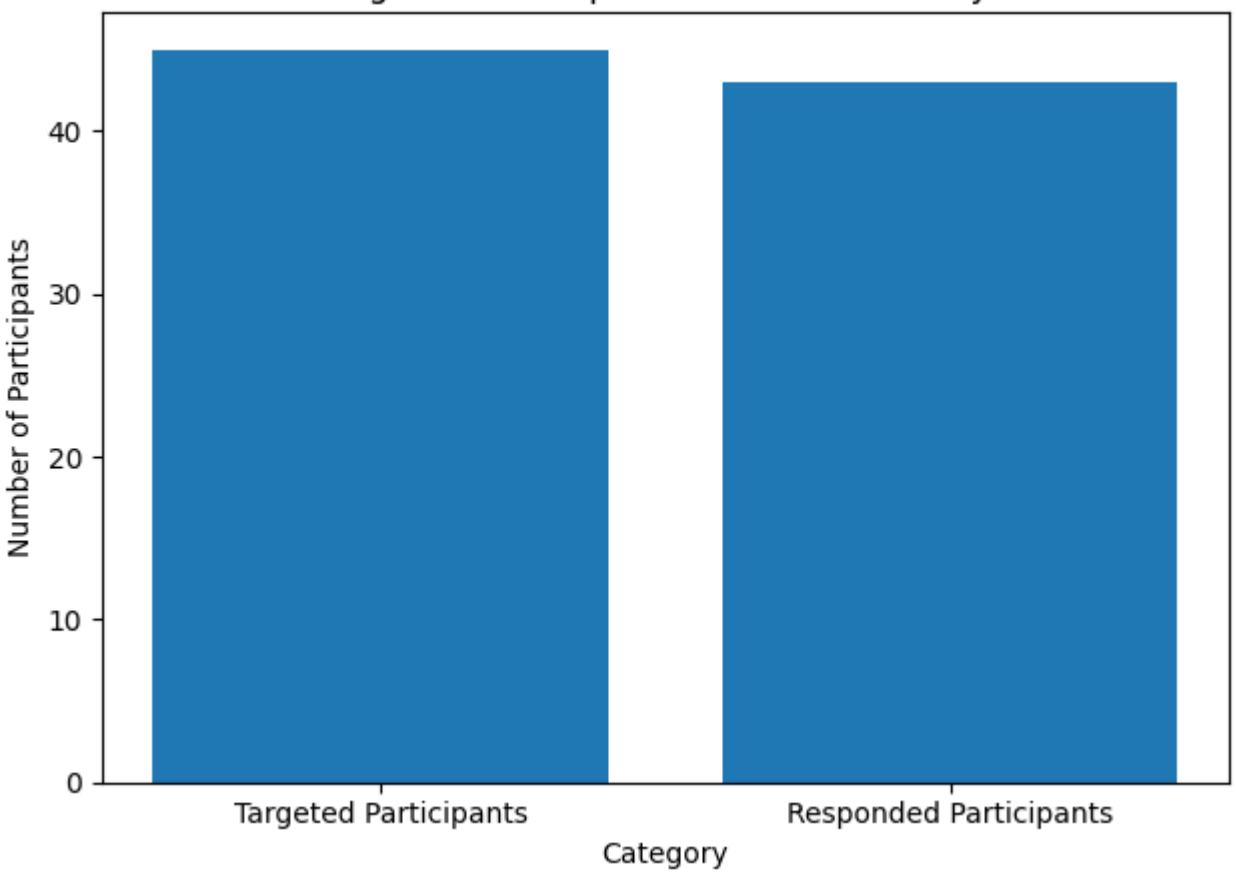


Table 4.1 below summarises the response rate of the study.

Category Number

Category	Number
Targeted Participants	45
Responded Participants	43
Response Rate (%)	95.6 %

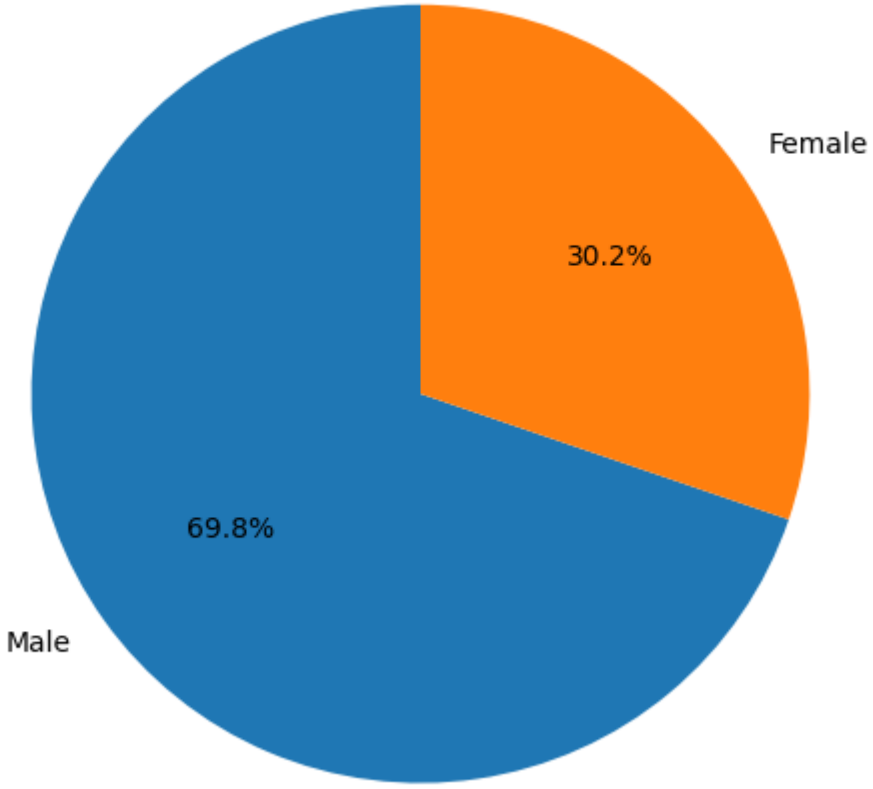
4.2 Demographic Profile of Respondents

This section presents the demographic profile of the respondents who participated in the study. The purpose of the demographic analysis is to provide contextual background information on the respondents and to demonstrate that the participants possessed relevant professional roles and experience necessary to provide informed and credible insights into last-mile logistics operations and the application of drone technology within the sector.

4.2.1 Respondents by gender type

This subsection presents the gender distribution of respondents who participated in the study. Understanding the gender composition of the sample is important, as it provides context on representation within the logistics and supply chain sector and helps to situate the perspectives shared on drone technology and last-mile logistics operations.

Figure 4.2.1: Gender Distribution of Respondents



Gender Frequency Percentage

Category	Number	Percentage
Male	30	69.8%
Female	13	30.2%
Total	43	

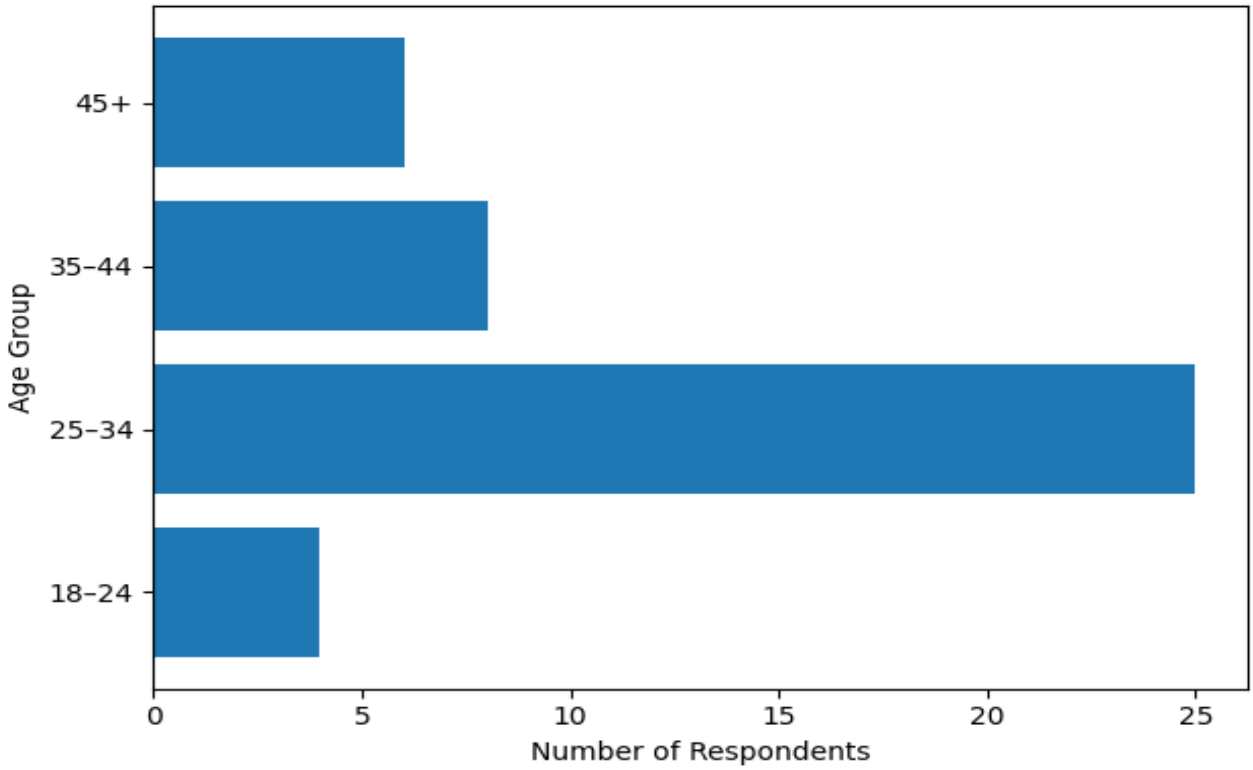
The findings indicate that the logistics and supply chain sector remains predominantly male-dominated, with male respondents accounting for 69.8% of the sample. However, female participation at 30.2% reflects a growing presence of women within logistics, customs, and related operational and regulatory roles. This level of female representation contributed valuable and diverse perspectives to the study, particularly in relation to operational decision

making, compliance considerations, and perceptions of technological innovation. The gender distribution therefore supports the credibility of the findings by reflecting both traditional industry structures and emerging inclusivity within the sector.

4.2.2 Respondents by age group

This subsection presents the age distribution of respondents who participated in the study. Analysing the age profile of respondents is important in understanding the level of professional maturity, exposure to logistics operations, and openness to technological innovation such as drone adoption within last-mile logistics.

Figure 4.2.2: Age Distribution of Respondents



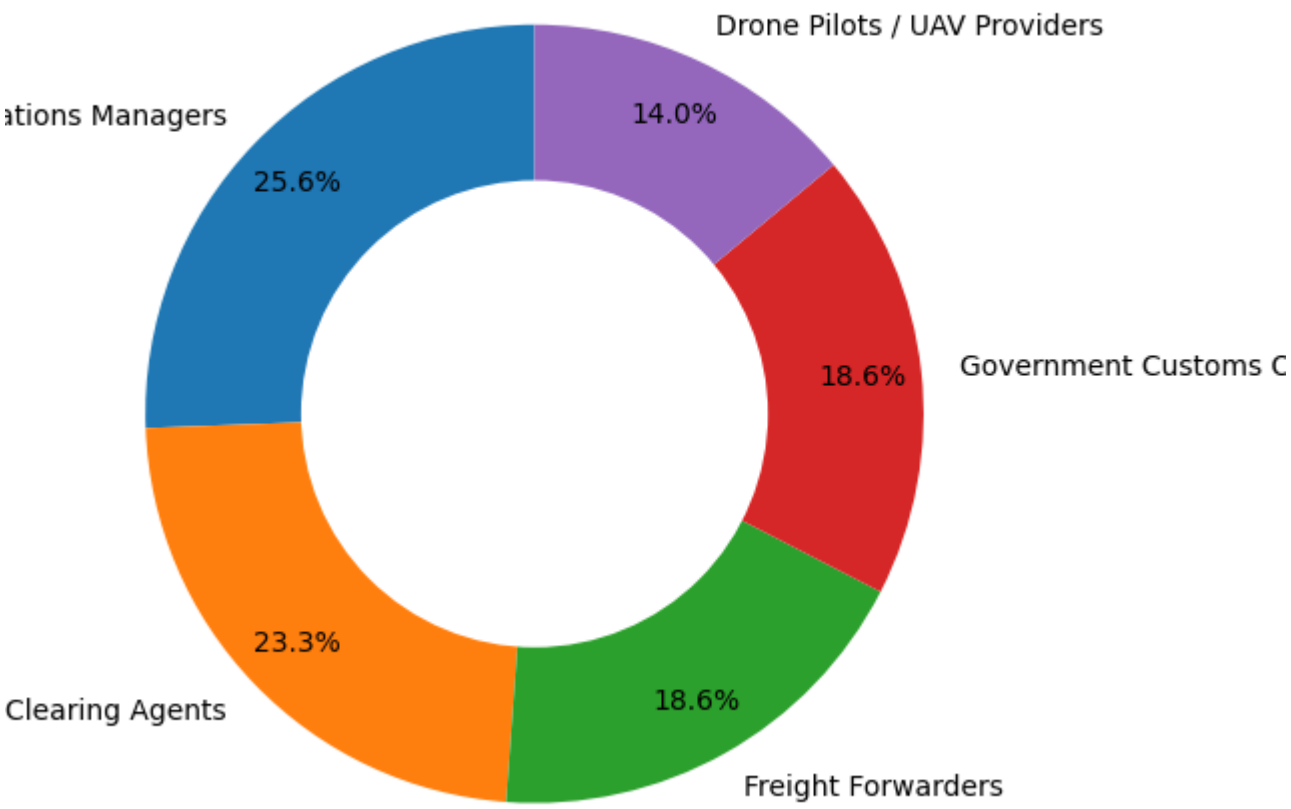
Age Group	Frequency	Percentage
18–24 years	4	9.3%
25–34 years	25	58.1%
35–44 years	8	18.6%
45 years and above	6	14.0%
Total	**43**	**100%**

The findings show that the majority of respondents (58.1%) were aged between 25 and 34 years. This age group represents an economically active segment of the workforce that is typically more engaged with operational execution and more receptive to the adoption of emerging technologies. Respondents aged 35 years and above accounted for 32.6% of the sample, contributing valuable managerial, strategic, and regulatory perspectives informed by extensive industry experience. The inclusion of younger respondents aged 18–24 years (9.3%) further strengthened the study by incorporating insights from early-career professionals who are often more exposed to digital and technological innovations. Overall, the age distribution enhanced the credibility of the findings by capturing a balanced mix of operational agility and strategic experience.

4.2.3 Respondents by role or position

This subsection presents the professional roles and positions held by respondents who participated in the study. Analysing respondents' roles is important in establishing that the data was obtained from individuals directly involved in logistics operations, regulatory oversight, and emerging drone-related services, thereby ensuring informed and credible insights into last-mile logistics and drone technology adoption.

Figure 4.2.3: Respondents by Role or Position



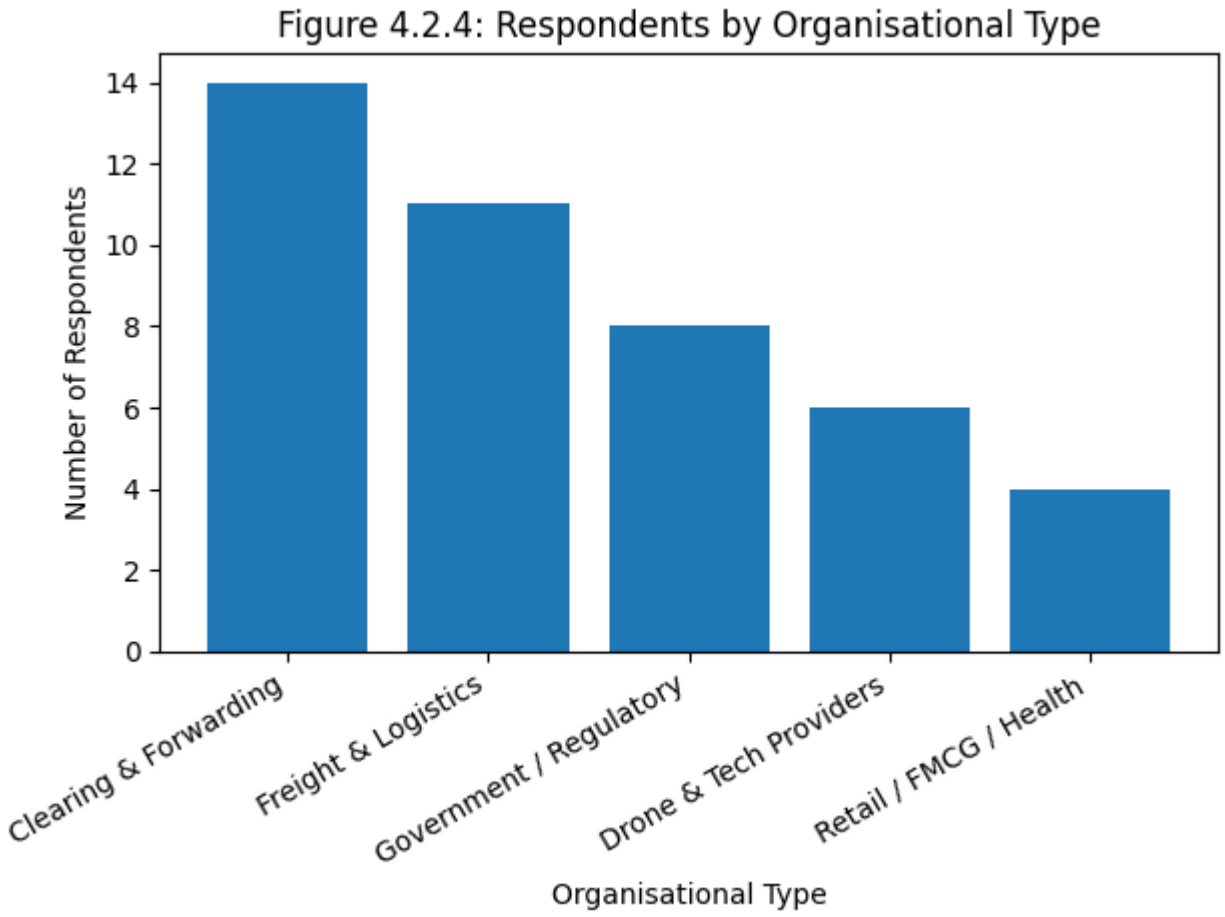
Role / Position	Frequency	Percentage
Operations Managers (Logistics & Clearing)	11	25.6%
Clearing Agents (Other Firms)	10	23.3%
Freight Forwarding Company Representatives	8	18.6%
Government Customs Officers	8	18.6%
Drone Pilots / UAV Service Providers	6	14.0%
Total	**43**	**100%**

The findings indicate that a substantial proportion of respondents were drawn from operational and execution-focused roles, with operations managers, clearing agents, and freight forwarding

representatives collectively accounting for 67.5% of the sample. This distribution reflects the study's strong focus on practical last-mile logistics challenges and day-to-day operational decision-making. The inclusion of government customs officers (18.6%) provided critical regulatory and compliance perspectives, particularly in relation to airspace management, customs control, and policy considerations surrounding drone deployment. Additionally, the participation of drone pilots and UAV service providers (14.0%) enriched the study by contributing technical and implementation-oriented insights. Overall, the diversity of professional roles strengthened the validity of the findings by ensuring that perspectives were drawn from across the logistics and drone ecosystem.

4.2.4 Respondents by organization type

This subsection presents the organisational backgrounds of the respondents who participated in the study. Analysing the types of organisations represented is important in demonstrating that the study captured perspectives from across the logistics value chain, including operational service providers, regulators, technology firms, and end-user clients involved in last-mile logistics activities.



Organisation Type	Frequency	Percentage
Clearing & Forwarding Companies	14	32.6%
Freight & Logistics Companies	11	25.6%
Government / Regulatory Institutions	8	18.6%
Drone & Technology Service Providers	6	14.0%

Organisation Type	Frequency	Percentage
Retail / FMCG / Health Logistics Clients	4	9.3%
Total	**43**	**100%**

The findings indicate that the majority of respondents were drawn from clearing, forwarding, and logistics companies, which together accounted for 58.2% of the sample. This reflects the operational focus of the study and ensures that the findings are grounded in practical last-mile logistics experiences. The inclusion of respondents from government and regulatory institutions (18.6%) provided critical insights into policy, compliance, and airspace management considerations relevant to drone deployment. Additionally, representation from drone and technology service providers (14.0%) contributed technical perspectives on feasibility and implementation, while retail, FMCG, and health logistics clients (9.3%) offered valuable end-user views on service expectations and acceptance. Overall, the diversity of organisational representation strengthened the credibility and comprehensiveness of the study findings.

4.3.1 Operational Efficiency of Drone Technology

Respondents widely acknowledged that drone technology has the potential to improve operational efficiency in last-mile logistics, particularly in terms of delivery speed and accessibility. Many participants indicated that drones could significantly reduce delivery times by bypassing road congestion and reaching locations that are difficult to access using conventional transport methods.

Several respondents highlighted that drone technology would be most effective for time-sensitive and lightweight consignments, such as medical supplies, urgent documents, and critical spare parts. According to one respondent, *"drones would be ideal for urgent deliveries where road delays are common, especially in congested urban areas or remote peri-urban locations."*

However, respondents also noted that the efficiency gains of drone technology are conditional upon factors such as payload capacity, battery life, weather conditions, and reliable operational planning. Some participants cautioned that drones should be viewed as a complementary solution rather than a replacement for traditional delivery vehicles. This suggests that a hybrid

logistics model could enhance overall operational efficiency when drones are strategically integrated into existing last-mile delivery systems.

4.3.2 Financial viability in Drone Technology for last mile logistics companies

This subsection presents the findings relating to the cost and financial implications of adopting drone technology in last-mile logistics operations. Respondents were asked to share their perceptions and experiences regarding the affordability, cost structure, and potential financial impact of integrating drone technology into existing logistics operations at Charlie Stevens International (CSI).

The majority of respondents indicated that initial capital investment constitutes the most significant financial barrier to the adoption of drone technology. Costs associated with acquiring suitable delivery drones, supporting ground control systems, specialised software, licensing requirements, and pilot training were consistently highlighted as substantial, particularly for small and medium-sized logistics firms operating in Zimbabwe. Several respondents noted that such upfront costs may be difficult to justify without clear evidence of return on investment.

In addition to initial investment requirements, respondents identified ongoing operational costs as a critical financial consideration. These included routine maintenance and repairs, battery replacement, insurance coverage, compliance-related expenses, and the need for skilled personnel to manage and operate drone systems. Participants expressed concern that these recurring costs could reduce potential efficiency gains if drone utilisation remains limited or inconsistent.

Despite these cost-related concerns, some respondents acknowledged that drone technology could offer selective cost-saving opportunities when deployed for specific use cases. In particular, drones were perceived as potentially cost-effective for urgent, time-sensitive, and lightweight deliveries where conventional vehicle-based transport may incur higher fuel, labour, and time-related costs. Respondents emphasised, however, that such benefits would depend on careful operational planning and targeted deployment.

Furthermore, respondents highlighted that the financial viability of drone adoption is closely linked to scale and utilisation levels. Low delivery volumes and fragmented demand were

perceived as risks that could increase the effective cost per delivery. As a result, several participants suggested that a phased approach, pilot projects, or strategic partnerships with specialised drone service providers could help mitigate financial risk during the early stages of adoption.

Overall, the findings suggest that while drone technology presents potential financial benefits in specific last-mile logistics scenarios, cost considerations remain a key constraint. Respondents viewed drone adoption as financially viable only if supported by prudent cost management, appropriate deployment strategies, and a clear understanding of operational demand.

4.3.3 Technical and Operational Constraints of Drone Technology

This subsection presents the findings relating to the technical and operational constraints associated with the adoption of drone technology in last-mile logistics operations. Respondents were asked to identify practical challenges that could affect the successful deployment and integration of drones within existing logistics systems at Charlie Stevens International (CSI).

A commonly cited constraint was limited payload capacity, which respondents noted restricts drone usage to lightweight consignments. This limitation was viewed as a significant barrier to broader adoption, particularly for logistics firms that primarily handle bulk or heavy goods. As a result, respondents emphasised that drones would be suitable only for a narrow range of delivery applications.

Respondents also highlighted battery life and flight range as critical operational constraints. Several participants indicated that limited flight duration and the need for frequent recharging could reduce operational efficiency, particularly when servicing dispersed delivery locations. Weather conditions, including strong winds and rainfall, were further identified as factors that could disrupt drone operations and affect service reliability.

In addition, respondents raised concerns regarding systems integration and operational readiness. Participants noted that effective drone deployment would require integration with existing logistics management systems, such as tracking, scheduling, and customer communication platforms. Without adequate systems integration, respondents believed that drones could introduce complexity rather than efficiency into last-mile operations.

Regulatory and compliance-related operational challenges were also frequently mentioned. Respondents indicated that restrictions related to airspace management, licensing, and operational approvals could limit flexibility and increase administrative burden. Some participants expressed concern that unclear or evolving regulations could slow down adoption and increase operational risk.

Overall, the findings suggest that while drone technology offers potential operational benefits, several technical and operational constraints must be addressed to ensure reliable and effective deployment. Respondents consistently emphasised that drones should complement existing delivery methods rather than replace traditional logistics systems.

Stakeholder Acceptance of Drone-Enabled Deliveries

While respondents acknowledged the potential benefits of drone technology, several noted that stakeholder acceptance would vary depending on awareness, prior exposure, and perceived benefits. Participants indicated that customers would be more accepting of drones for urgent, lightweight, or specialised deliveries, particularly where speed and reliability are prioritised.

However, some respondents suggested that acceptance may be gradual, with stakeholders requiring time to adjust to the idea of drone deliveries, especially in contexts where traditional delivery methods are deeply entrenched.

Trust, Safety, and Regulatory Concerns

Trust emerged as a critical factor influencing stakeholder acceptance. Respondents expressed concerns related to safety, privacy, and regulatory compliance, noting that stakeholders may be hesitant to trust drone technology without clear assurances and safeguards.

Participants emphasised that trust would depend on CSI's ability to demonstrate compliance with aviation regulations, ensure secure operations, and communicate transparently with customers and communities regarding drone usage. Regulatory approval and visible oversight were viewed as essential for building confidence in drone-enabled logistics

Interpretation

Overall, the findings indicate that while stakeholders generally perceive drone technology as innovative and potentially beneficial, acceptance and trust would depend on awareness, safety assurances, and regulatory compliance. Respondents suggested that stakeholder confidence in drone-enabled logistics at CSI would increase through gradual implementation, effective communication, and demonstrated operational reliability. These findings directly address the third research objective concerning stakeholder perceptions, acceptance, and trust in drone technology.

4.4 Chapter Summary

This chapter presented the empirical findings of the study based on qualitative data collected through semi-structured interviews with internal and external stakeholders within Zimbabwe's logistics and drone technology ecosystem. The chapter first established the credibility of the data through an analysis of the response rate and demographic profile of respondents, confirming that participants possessed relevant operational, regulatory, and technical experience necessary to provide informed insights into last-mile logistics operations at Charlie Stevens International (CSI).

The findings revealed that drone technology is perceived as having the potential to enhance operational efficiency in last-mile logistics, particularly for urgent, time-sensitive, and lightweight deliveries. Respondents highlighted the ability of drones to bypass road congestion, improve delivery turnaround times, and reach difficult or remote locations as key advantages within the Zimbabwean context. However, these efficiency gains were viewed as conditional upon careful operational planning and targeted deployment rather than broad, unrestricted use.

The chapter also identified cost and financial considerations as a major constraint to drone adoption. Respondents consistently expressed concern regarding the initial investment requirements and ongoing operational costs associated with drone technology, particularly for

small and medium-sized logistics firms. While selective cost-saving opportunities were acknowledged, respondents emphasised that financial viability would depend on utilisation levels, scale, and the adoption of phased or partnership-based implementation approaches.

In addition, the findings highlighted several technical and operational constraints, including limited payload capacity, battery life, weather sensitivity, systems integration challenges, and regulatory compliance requirements. These constraints reinforced the view that drone technology should be positioned as a complementary component within a hybrid last-mile delivery model rather than as a replacement for conventional transport methods.

Overall, the findings suggest that while drone technology presents promising opportunities for improving last-mile logistics performance at CSI, its adoption must be carefully aligned with organisational capacity, operational realities, and cost considerations. This chapter has provided the empirical foundation upon which the strategic evaluation of drone technology adoption will be undertaken in Chapter Five. The next chapter applies established strategic frameworks to assess the suitability, acceptability, and feasibility of drone technology as a strategic option for Charlie Stevens International.

Drones offer logistics firms the potential to bypass traditional infrastructure limitations, particularly in emerging markets where road and transport networks remain underdeveloped (World Economic Forum, 2022).

Source: www.freepik.com (https://shorturl.at/kcztw)

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter brings together the findings of the study by drawing conclusions on the efficiency and viability of drone technology in last-mile logistics operations at Charlie Stevens International (CSI). The focus is on consolidating what emerged from the empirical evidence and assessing what these findings mean within the operational, financial, and regulatory realities of Zimbabwe's logistics sector. Rather than extending analysis, the chapter concentrates on establishing clear outcomes from the research and identifying practical actions that can reasonably be pursued.

The conclusions presented are aligned with the research objectives and reflect the three key areas examined in the study: operational efficiency, financial viability, and stakeholder and regulatory acceptance of drone technology. These conclusions are informed by the experiences and perspectives of logistics practitioners and ecosystem stakeholders and are grounded in the conditions under which CSI currently operates. Attention is therefore given to the specific contexts in which drone technology demonstrated potential value, as well as the limitations that constrain its broader application.

Given the early stage of commercial drone logistics in Zimbabwe, the question of feasibility is central. The findings suggest that while drone technology offers opportunities to improve last-mile delivery performance, its adoption is shaped by regulatory approval processes, cost considerations, technical constraints, and organisational readiness. As a result, drone adoption cannot be viewed as a single decision but as a gradual process that requires alignment between operational needs, compliance requirements, and strategic priorities.

The recommendations that follow are informed by this reality and are framed with an emphasis on implementation over time. By distinguishing between short-term, medium-term, and long-term actions, the chapter reflects how CSI could realistically explore, develop, and integrate drone technology within its logistics operations. This approach ensures that the outcomes of the study remain practical, context-sensitive, and relevant to decision-making within CSI and the wider Zimbabwean logistics environment.

5.1 CONCLUSIONS

5.1.1 Conclusion Operational Efficiency of Drone Technology at Charlie Stevens International

This conclusion addresses the first research objective, which examined the operational efficiency of drone technology in last-mile logistics operations at Charlie Stevens International (CSI). The findings of the study indicate that drone technology has the potential to enhance delivery speed and route efficiency, particularly for lightweight and time-sensitive consignments and deliveries to locations that are difficult to access using conventional road transport. Respondents highlighted that drones can bypass traffic congestion and infrastructure-related delays, which are common challenges within Zimbabwe's logistics environment.

However, the study also established that operational efficiency gains from drone technology are not uniform across all delivery contexts. Factors such as limited payload capacity, flight range, weather sensitivity, and airspace restrictions constrain the extent to which drones can be deployed across CSI's full delivery network. As a result, drones were viewed as effective only in specific operational scenarios rather than as a universal last-mile delivery solution.

Overall, the findings suggest that drone technology can contribute to improved operational efficiency at CSI when applied selectively and within clearly defined delivery parameters. Within the current operating environment, drone technology is therefore best positioned as a complementary solution that supports existing vehicle-based logistics operations rather than replacing conventional last-mile delivery methods.

5.1.2 Conclusion on the Financial Viability of Drone Technology at CSI

This conclusion addresses the second research objective, which examined the financial viability of adopting drone technology within Charlie Stevens International's (CSI) last-mile logistics operations. The findings indicate that while drone technology presents potential cost advantages in specific delivery contexts, its overall financial viability remains conditional within the current operating environment. Participants noted that drones may reduce certain variable costs, such as fuel consumption and vehicle wear, particularly for short-distance and time-critical deliveries.

However, the study found that the initial and ongoing costs associated with drone adoption present significant financial constraints. These include acquisition costs, maintenance and repair expenses, pilot training and certification, insurance requirements, and regulatory compliance fees. In addition, limited delivery capacity and low utilisation rates at early stages of adoption reduce the ability to achieve economies of scale, which further affects cost efficiency.

The findings therefore suggest that drone technology is not immediately financially viable as a large-scale replacement for conventional last-mile delivery methods at CSI. Financial viability is more likely to be realised through selective deployment, phased investment, and integration with existing logistics operations. Under current conditions, drone adoption represents a cautious, incremental investment rather than a cost-saving solution in the short term.

5.1.3 Conclusion on Stakeholder and Regulatory Acceptance of Drone Technology in Zimbabwe

This conclusion addresses the third research objective, which examined stakeholder perceptions and the level of regulatory acceptance of drone technology in last-mile logistics operations in Zimbabwe. The findings indicate that stakeholder acceptance of drone technology is cautiously positive but highly conditional. Participants recognised the potential efficiency benefits of drone-enabled deliveries, particularly for urgent and hard-to-reach locations, but emphasised that acceptance depends on demonstrated safety, reliability, and compliance with existing regulations.

The study further found that regulatory acceptance plays a central role in shaping the feasibility of drone adoption. While drone operations are permitted in Zimbabwe under the oversight of the Civil Aviation Authority of Zimbabwe (CAAZ), respondents highlighted that approval processes, licensing requirements, and airspace controls remain stringent. These regulatory conditions, although necessary for safety and security, were perceived as time-consuming and costly, particularly for logistics firms seeking to deploy drones for commercial purposes.

In addition, the findings revealed that trust among clients, communities, and internal staff influences acceptance alongside regulatory approval. Concerns relating to safety, privacy, and operational reliability were identified as factors that may limit broader acceptance if not adequately addressed through communication, pilot demonstrations, and compliance-led

operations. Overall, the study concludes that stakeholder and regulatory acceptance of drone technology in Zimbabwe is achievable, but contingent upon strict adherence to regulatory requirements, transparent engagement with stakeholders, and consistent demonstration of operational safety and reliability.

5.1.4 Overall Strategic Conclusion on Drone Adoption at Charlie Stevens International

This overall conclusion integrates the findings on operational efficiency, financial viability, and stakeholder and regulatory acceptance of drone technology at Charlie Stevens International (CSI). Taken together, the findings indicate that drone technology represents a strategically relevant but conditional opportunity for CSI's last-mile logistics operations. While drones offer measurable benefits in specific delivery contexts, their application is constrained by financial considerations, technical limitations, and regulatory requirements.

From a strategic standpoint, drone adoption at CSI aligns with the firm's objective of improving service responsiveness and operational flexibility within a challenging logistics environment. Consistent with strategic evaluation principles highlighted by Johnson and Scholes (2020), the appropriateness of drone technology for CSI is determined by its alignment with organisational capabilities, risk tolerance, and the external regulatory environment, rather than by technological potential alone.

The findings further suggest that drone technology does not constitute a disruptive replacement for existing delivery systems, but rather an incremental capability that can enhance performance in targeted areas of operation. Its strategic value therefore lies in selective and controlled deployment, supported by compliance-led processes and operational learning. Overall, the study concludes that drone adoption at CSI should be viewed as a complementary strategic option that strengthens service delivery under defined conditions, rather than as a wholesale transformation of last-mile logistics operations.

5.2 RECOMMENDATIONS

5.2.1 Strategic Framework for the Recommendation

In developing strategic recommendations for the adoption of drone technology within the operations of Charlie Stevens International (CSI), it is important to evaluate potential strategies using a structured strategic management framework. According to Johnson, Scholes and

Whittington (2020), effective strategy development requires organisations to assess whether proposed strategic initiatives are appropriate for the organisation's environment, acceptable to key stakeholders, and feasible given available resources and capabilities. These three dimensions are captured in the **Strategic Suitability, Acceptability and Feasibility (SAF) framework**, which is widely used to evaluate the practicality and sustainability of strategic options.

The **suitability** dimension examines whether a proposed strategy addresses the key operational challenges faced by an organisation and aligns with its broader strategic objectives. In the context of this study, suitability relates to whether the adoption of drone technology can effectively respond to the last-mile delivery inefficiencies, infrastructure limitations and service reliability challenges identified within CSI's logistics operations.

The **acceptability** dimension focuses on the extent to which a strategy is supported by key stakeholders and whether the potential risks and returns associated with the strategy are considered acceptable. For CSI, stakeholder acceptance is particularly important given the regulatory sensitivity of drone technology. Key stakeholders include regulatory authorities such as the Civil Aviation Authority of Zimbabwe (CAAZ), logistics clients who may utilise drone-enabled delivery services, as well as internal organisational stakeholders including management and operational staff.

The **feasibility** dimension evaluates whether the organisation has the financial, technical and organisational capacity required to implement the proposed strategy. In the case of drone technology adoption, feasibility considerations include the cost of drone acquisition and operations, regulatory compliance requirements, technical expertise, and the organisation's ability to integrate drone-enabled delivery into existing logistics systems.

The following recommendations are derived from the strategic evaluation conducted in this study and are guided by the **Strategic Suitability, Acceptability and Feasibility (SAF) framework** proposed by Johnson, Scholes and Whittington (2020). The recommendations are designed to provide practical strategic actions that Charlie Stevens International (CSI) can consider in exploring the adoption of drone technology within its last-mile logistics operations.

Each recommendation addresses key strategic considerations identified in the research findings, including technological adoption, stakeholder engagement, financial feasibility, organisational readiness and industry collaboration. Collectively, these recommendations provide a structured pathway through which CSI can cautiously evaluate and potentially integrate drone technology while maintaining regulatory compliance and operational stability.

5.2.2 Recommendation 1: Adoption of Drone Technology in CSI Logistics Operations

Charlie Stevens International (CSI) should adopt drone technology as a complementary innovation to enhance efficiency within selected last-mile logistics operations. The findings of this study indicate that drone technology has the potential to improve delivery speed, operational flexibility and service responsiveness, particularly in delivery scenarios where traditional road transport experiences delays due to congestion, infrastructure limitations or accessibility challenges. Adopting drone-enabled logistics therefore aligns with CSI's strategic objective of improving service reliability and exploring innovative logistics solutions within an increasingly technology-driven industry.

From the perspective of the Strategic Suitability dimension of the SAF framework, the adoption of drone technology offers CSI an opportunity to respond to operational inefficiencies identified in the study while positioning the organisation to participate in emerging logistics innovations. Globally, logistics firms are increasingly exploring drone-assisted delivery as a way of improving last-mile delivery performance and enhancing customer service capabilities. By exploring drone adoption, CSI can remain competitive and responsive to evolving technological trends within the logistics sector.

To ensure effective implementation, CSI should adopt a phased adoption strategy rather than pursuing immediate full-scale deployment. This approach will allow the organisation to gradually evaluate operational performance while managing regulatory, technical and organisational risks associated with new technology adoption. As part of this process, CSI should first identify delivery routes and cargo categories where drone-assisted delivery could provide clear operational advantages, particularly for lightweight or time-sensitive consignments. The company should then engage with the Civil Aviation Authority of Zimbabwe (CAAZ) to obtain clarity on licensing requirements, operational approvals and

airspace regulations governing commercial drone use. Following regulatory engagement, CSI should implement a small-scale pilot programme, either through leasing drone services or partnering with licensed drone operators, in order to test drone-assisted delivery within selected routes. During this pilot phase, CSI should systematically monitor operational indicators such as delivery speed, reliability and service performance to determine the practical value and scalability of drone-enabled logistics within its operations.

This phased approach allows CSI to experiment with drone logistics in a controlled manner while gathering operational insights that can inform future decisions regarding technology adoption. It also reduces organisational risk by allowing the company to evaluate drone technology before committing to larger investments. The implementation of this recommendation should be undertaken in the short term, within approximately the first two years of CSI's strategic technology adoption planning.

5.2.3 Recommendation 2: Stakeholder Engagement and Regulatory Collaboration

Charlie Stevens International (CSI) should prioritise structured stakeholder engagement and regulatory collaboration as part of its strategy for exploring drone-enabled logistics operations. The adoption of drone technology is highly dependent on regulatory approval and stakeholder acceptance, particularly in relation to aviation safety, airspace management and operational compliance. As such, early and continuous engagement with key stakeholders will be essential to ensure that drone adoption efforts are conducted responsibly and within the existing legal and institutional framework governing unmanned aerial systems in Zimbabwe.

From the perspective of the Strategic Acceptability dimension of the SAF framework**,** effective stakeholder engagement is critical in ensuring that drone technology adoption is supported by the institutions responsible for regulating aviation and logistics operations. CSI should therefore establish ongoing communication with the **Civil Aviation Authority of Zimbabwe (CAAZ)** in order to remain informed about licensing requirements, operational regulations and safety standards applicable to commercial drone operations. Maintaining this regulatory dialogue will help CSI ensure that any future drone deployment initiatives are aligned with national aviation regulations and industry safety expectations.

In addition to regulatory engagement, CSI should also strengthen collaboration with other key stakeholders within the logistics ecosystem. This includes engaging logistics clients to identify

delivery needs that may benefit from drone-assisted services, collaborating with technology providers and drone operators who possess relevant technical expertise, and maintaining open communication with internal staff to ensure organisational readiness for potential technological change. By fostering transparent communication and collaboration with these stakeholders, CSI can build confidence in the responsible use of drone technology while reducing resistance to innovation within both regulatory and operational environments.

Through proactive stakeholder engagement, CSI will be better positioned to understand regulatory expectations, identify partnership opportunities and build institutional support for drone-enabled logistics initiatives. This collaborative approach will reduce uncertainty associated with emerging technologies and support the responsible exploration of drone logistics within Zimbabwe's evolving aviation and logistics landscape.

This recommendation should be implemented in the short term, as early stakeholder engagement is essential to creating the regulatory and institutional foundation required for any future drone deployment initiatives.

5.2.4 Recommendation 3: Financing Strategy and Cost Management for Drone Adoption

For Charlie Stevens International (CSI) to successfully explore the adoption of drone technology within its logistics operations, the company must develop a clear financing strategy that supports the acquisition, testing and operational management of drone-enabled delivery systems. The introduction of new logistics technologies typically requires initial capital investment in equipment, regulatory compliance, operational systems and staff training. As such, careful financial planning is necessary to ensure that the adoption of drone technology remains financially sustainable while allowing CSI to evaluate the operational benefits associated with emerging logistics innovations.

From the perspective of the Strategic Feasibility dimension of the SAF framework, the ability of CSI to implement drone-enabled logistics will depend largely on its capacity to mobilise the financial resources required to support pilot projects and early-stage operations. Rather than committing to large capital investments at the outset, CSI should adopt a financially cautious

approach by allocating resources toward small-scale pilot initiatives that allow the organisation to test the operational viability of drone-assisted deliveries before expanding investments.

The potential cost components associated with introducing drone-enabled delivery services may include equipment acquisition, licensing and regulatory compliance, pilot project operations, maintenance requirements and staff training. Table 5:1 presents an indicative estimate of the potential cost structure associated with initiating a small-scale drone logistics pilot project within CSI.

Table 5.1: Indicative Cost Structure for Initial Drone Logistics Implementation

Cost Component	Estimated Cost (USD)	Description
Drone acquisition (1–2 units)	$10,000 – $40,000	Purchase of commercial delivery drones suitable for logistics testing
Regulatory licensing and approvals	$1,000 – $5,000	Aviation registration, licensing and compliance requirements
Pilot project operations	$5,000 – $10,000	Testing operations, route trials and logistics coordination
Maintenance and technical support	$2,000 – $5,000	Routine maintenance and technical servicing
Staff training and operational preparation	$3,000 – $6,000	Training staff on drone oversight and safety procedures

Estimated Initial Pilot Investment :Approximately $21,000 – $66,000

These cost estimates demonstrate that drone adoption can initially be explored through relatively controlled investment levels when compared to large-scale infrastructure expansion in traditional logistics operations.

To finance this investment, CSI should consider a diversified financing approach that minimises financial risk while allowing the organisation to experiment with emerging logistics technologies. Potential financing sources may include internal capital allocation from CSI's operational reserves, strategic partnerships with drone technology providers who may offer leasing or service-based models, and collaboration with logistics innovation initiatives or development programmes that support technology adoption within African logistics sectors. In addition, CSI may explore opportunities to access innovation grants, technology development funds or industry partnerships that support the exploration of emerging logistics solutions.

Adopting such a diversified financing strategy will allow CSI to reduce the financial burden associated with technology experimentation while maintaining flexibility in its approach to drone adoption. By combining internal funding with external partnerships and innovation support mechanisms, CSI can gradually build the financial capacity required to evaluate drone logistics while protecting the organisation from excessive investment risk during the early stages of adoption.

This recommendation should be implemented in the short to medium term, as financial planning and resource mobilisation will be necessary before CSI can begin implementing pilot drone logistics initiatives.

5.2.5 Recommendation 4: Workforce Training and Organisational Readiness

Charlie Stevens International (CSI) should invest in workforce training and organisational readiness to support the potential integration of drone technology within its logistics operations. The introduction of new technological systems often requires organisations to develop new technical skills, operational procedures and safety protocols to ensure that emerging technologies are implemented effectively and responsibly. As such, preparing the organisation's workforce for the potential adoption of drone-enabled logistics services will be an important step in supporting long-term operational success.

From the perspective of the Strategic Feasibility dimension of the SAF framework, the successful implementation of drone technology will depend not only on financial investment and regulatory approval but also on the organisation's ability to develop the internal capabilities required to manage and coordinate drone-enabled delivery operations. CSI should therefore prioritise the development of relevant operational knowledge among its logistics personnel, including an understanding of drone logistics workflows, safety procedures and regulatory compliance requirements associated with unmanned aerial systems.

To support organisational readiness, CSI should introduce targeted training initiatives for staff involved in logistics planning, compliance and operational coordination. This may include participation in drone awareness workshops, collaboration with drone technology providers to understand operational requirements and exposure to industry best practices related to drone logistics management. In addition, CSI should develop internal operational guidelines that outline the procedures for coordinating drone-enabled deliveries within the company's broader

logistics systems. For example, these guidelines may define how drone deliveries are scheduled within existing dispatch systems, outline safety and compliance procedures for handling drone-related operations, and establish protocols for monitoring flight performance and delivery completion within the company's logistics tracking processes.

Strengthening workforce capacity will also help build internal stakeholder confidence in the safe and responsible use of drone technology. By ensuring that employees understand the purpose, operational role and safety considerations associated with drone logistics, CSI can reduce organisational resistance to technological change while supporting a culture of innovation within the company.

Overall, investing in workforce readiness will enable CSI to build the organisational capability required to effectively manage drone-assisted logistics operations should the company decide to scale drone adoption in the future.

This recommendation should be implemented in the medium term, as workforce development and organisational readiness will be necessary to support the gradual integration of drone technology into CSI's logistics operations.

5.2.6 Recommendation 5: Strategic Partnerships and Industry Collaboration

Charlie Stevens International (CSI) should pursue strategic partnerships and industry collaborations to support the responsible exploration and potential integration of drone technology within its logistics operations. Emerging technologies such as drone-assisted delivery often require specialised technical expertise, regulatory knowledge and operational capabilities that may not be immediately available within traditional logistics organisations. Strategic partnerships therefore provide an effective pathway through which CSI can access the technological knowledge, operational experience and regulatory support required to explore drone-enabled logistics services in a controlled and collaborative manner.

From the perspective of the Strategic Suitability dimension of the SAF framework**, strategic** partnerships allow CSI to strengthen its innovation capacity while reducing the operational risks associated with independently introducing new technology. Collaboration with experienced drone operators, aviation technology firms or research institutions can provide access to technical expertise in drone operations, flight management systems, safety procedures

and regulatory compliance. Through such collaborations, CSI can gradually build its understanding of drone logistics while ensuring that operational standards remain aligned with aviation safety expectations.

Strategic partnerships also strengthen stakeholder acceptability, particularly within a regulatory environment where drone technology remains subject to strict oversight. By working with licensed drone operators, aviation service providers and recognised technology partners, CSI can demonstrate to regulatory authorities such as the **Civil Aviation Authority of Zimbabwe (CAAZ)** that its exploration of drone logistics is being conducted in a responsible and professionally supported manner. Collaborative engagement with regulators may also contribute to the development of clearer operational frameworks for commercial drone logistics in Zimbabwe, allowing companies such as CSI to participate in shaping emerging industry standards.

However, while strategic partnerships offer significant opportunities, they may also present several operational and governance challenges that CSI must carefully manage. These challenges may include issues related to regulatory uncertainty, data security concerns, operational coordination between partner organisations and the potential dependence on external technology providers. In addition, government authorities may express concerns regarding aviation safety, airspace management and the potential misuse of drone technology. These concerns highlight the importance of maintaining transparent communication with regulators and ensuring that all drone-related activities adhere strictly to national aviation policies and safety guidelines.

To mitigate these challenges, CSI should adopt a structured partnership strategy that emphasises compliance, transparency and clearly defined operational responsibilities. This may include formal agreements that outline the roles and responsibilities of each partner, adherence to aviation safety protocols approved by CAAZ and the implementation of joint operational monitoring systems to ensure accountability in drone operations. CSI should also ensure that any technology partnerships prioritise data protection, operational safety and regulatory compliance in order to maintain trust among both regulators and logistics clients.

Strategic partnerships may also create broader opportunities for CSI to position itself as a participant in the emerging logistics innovation ecosystem within Zimbabwe and the wider

African region. Collaboration with technology providers, aviation authorities and research institutions may allow CSI to contribute to pilot programmes, knowledge-sharing initiatives and industry forums that explore the future of drone-assisted logistics. Participation in such initiatives can enhance the organisation's reputation as an innovative logistics provider while strengthening its long-term capacity to adopt new technologies responsibly.

By adopting a collaborative and carefully managed partnership strategy, CSI can leverage external expertise while maintaining control over its strategic direction. This approach enables the company to explore technological innovation while minimising operational risk and strengthening relationships with key stakeholders within the aviation and logistics sectors.

This recommendation should be implemented in the medium to long term, as strategic partnerships will play an important role in supporting the gradual and sustainable integration of drone technology into CSI's logistics operations.

5.2.5 Areas of Future Research

This study focused on evaluating the efficiency and viability of drone technology in last-mile logistics operations using a qualitative case study of Charlie Stevens International (CSI). While the findings provide useful insights into operational, financial, and regulatory considerations, several areas remain open for further investigation.

Future research could adopt a quantitative or mixed-methods approach to assess the cost efficiency and performance impacts of drone-enabled deliveries over time. Longitudinal studies examining delivery times, cost savings, utilisation rates, and return on investment would provide deeper evidence on the financial sustainability of drone logistics beyond pilot and early adoption stages. Such analysis would be particularly valuable as regulatory frameworks and technology maturity evolve.

Further research may also explore customer and community perceptions of drone-enabled delivery services in greater depth. Understanding end-user acceptance, privacy concerns, and service expectations would complement organisational and regulatory perspectives and support more inclusive adoption strategies. In addition, comparative studies across multiple logistics firms or across different African countries could provide broader insights into how contextual factors influence drone adoption in emerging markets.

Finally, future studies could examine the integration of drone technology with other digital logistics solutions, such as warehouse automation, route optimisation systems, and real-time tracking platforms. Exploring these intersections would contribute to a more holistic understanding of how drone technology fits within wider logistics digitalisation and innovation strategies.

5.3 Chapter Summary

This chapter presented the conclusions and strategic recommendations arising from the study on the efficiency and viability of drone technology in last-mile logistics operations at Charlie Stevens International (CSI). The chapter began by summarising the key findings of the research in relation to the study objectives, highlighting the potential of drone technology to improve delivery efficiency, operational flexibility and service responsiveness within specific logistics contexts. At the same time, the findings also emphasised that the successful adoption of drone technology depends on several critical factors, including regulatory compliance, organisational readiness, financial capacity and stakeholder acceptance.

In order to translate these findings into practical strategic guidance, the chapter applied the **Strategic Suitability, Acceptability and Feasibility (SAF) framework** proposed by Johnson, Scholes and Whittington (2020). This framework provided a structured lens through which potential strategies for drone technology adoption could be evaluated within the operational and regulatory environment in which CSI operates. Through this strategic evaluation, the

chapter demonstrated that while drone technology presents promising opportunities for improving last-mile logistics efficiency, its adoption must be approached cautiously through phased implementation, stakeholder collaboration and careful organisational preparation.

Based on this strategic evaluation, the chapter proposed five key recommendations designed to guide CSI in exploring and potentially integrating drone technology within its logistics operations. These recommendations included the gradual adoption of drone-enabled delivery services through pilot initiatives, proactive stakeholder engagement and regulatory collaboration, the development of a financing strategy to support technology adoption, the strengthening of workforce training and organisational readiness, and the establishment of strategic partnerships to support technological innovation and knowledge development within the logistics sector. Together, these recommendations provide a structured pathway through which CSI can responsibly explore drone technology while managing regulatory, operational and financial considerations.

Overall, the chapter demonstrates that drone technology represents a promising but conditional innovation within the logistics sector. For CSI, the strategic value of drone technology lies not in replacing traditional logistics systems, but in complementing existing delivery methods in specific operational contexts where speed, accessibility and flexibility are critical. By adopting a phased and collaborative approach to technology exploration, CSI can position itself to benefit from emerging logistics innovations while maintaining operational stability and regulatory compliance.

In conclusion, this chapter has translated the empirical findings of the study into practical strategic insights relevant to both CSI and the broader logistics sector. The recommendations outlined in this chapter provide a realistic framework through which logistics firms operating in emerging markets such as Zimbabwe can cautiously evaluate the potential of drone technology while responding to the operational realities of their local environments.

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APPENDIX A: Participant Information Sheet

Study Title:
Evaluating the Efficiency and Viability of Drone Technology in Last-Mile Logistics Operations in Zimbabwe: A Case Study of Charlie Stevens International (CSI)

Purpose of the Study

The purpose of this study is to evaluate the efficiency and viability of drone technology in last-mile logistics operations in Zimbabwe, using Charlie Stevens International (CSI) as a case study. The study aims to generate insights into operational efficiency, financial viability, and stakeholder acceptance of drone-enabled logistics solutions.

Participation

Participation in this study is entirely voluntary. You are free to decline participation or withdraw from the study at any time without any penalty or negative consequences.

Data Collection

Data will be collected through a semi-structured interview. The interview is expected to last approximately 30–45 minutes.

Confidentiality and Anonymity

All information provided during the interview will be treated as confidential. Your name and any identifying details will not appear in the dissertation or any related publications. Data will be anonymised and stored securely.

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W: www.csi.co.zw

Use of Information

The information collected will be used solely for academic purposes in partial fulfilment of the requirements for the Global MBA programme at the Catholic University of Zimbabwe.

Contact Information

Researcher: Chiedza Makwara-Mswaka
Institution: Catholic University of Zimbabwe

If you have any questions regarding this study, you are encouraged to contact the researcher.

APPENDIX B: Informed Consent Form

Study Title:
Evaluating the Efficiency and Viability of Drone Technology in Last-Mile Logistics Operations in Zimbabwe: A Case Study of Charlie Stevens International (CSI)

Please read the statements below carefully and indicate your consent by ticking the appropriate boxes and signing where indicated.

☐ I confirm that I have read and understood the Participant Information Sheet.

☐ I understand that my participation in this study is voluntary.

☐ I understand that I may withdraw from the study at any time without penalty.

☐ I consent to participate in this study.

☐ I consent to the use of anonymised data for academic purposes.

Participant Name: _____

Signature: _____

Date: _____

Researcher Name: Chiedza Makwara-Mswaka

Signature: _____

Date: _____

CHARLIE STEVENS INTERNATIONAL

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APPENDIX C: Demographic Questionnaire

Please tick (✓) or circle the appropriate option.

1. Gender:
☐ Male ☐ Female ☐ Prefer not to say

Answer:
_____

2. Age Group:
☐ 18–25 ☐ 26–35 ☐ 36–45 ☐ 46–55 ☐ 56+

Answer:
_____

3. Role / Position:
☐ Senior Management
☐ Operations / Logistics
☐ Technical / Aviation
☐ Regulatory / Policy
☐ Other (please specify): _____

Answer:
_____

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4. Organisation Type:
☐ Logistics / Freight Forwarding
☐ Aviation / Drone Services
☐ Government / Regulator
☐ Technology / ICT
☐ Other: _____

Answer:_____

APPENDIX D: Semi-Structured Interview Guide

Study Title:
Evaluating the Efficiency and Viability of Drone Technology in Last-Mile Logistics Operations in Zimbabwe: A Case Study of Charlie Stevens International (CSI)

Section A: Background Information

1. Please describe your role and responsibilities within your organisation.

2. How many years of experience do you have in logistics or related operations?

3. Can you briefly describe your organisation's involvement in last-mile logistics activities?

Section B: Operational Efficiency

4. What are the main challenges your organisation faces in last-mile delivery operations?

5. In your view, how could drone technology improve delivery speed and route efficiency?

6. How might drones address challenges related to fuel costs, traffic congestion, or inaccessible delivery locations?

7. What operational risks or limitations do you associate with the use of drones in logistics?

Section C: Financial Viability

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8. What cost factors would influence your organisation's decision to adopt drone technology?

9. Do you believe drone technology could reduce long-term operating costs? Please explain.

10. What financial or investment barriers could limit drone adoption in your organisation?

11. How important is scalability when considering drone technology for logistics operations?

Section D: Stakeholder Acceptance and Regulation

12. How do employees, clients, and management perceive drone technology in logistics operations?

13. What concerns, if any, exist regarding safety, privacy, or regulatory compliance?

14. How does the current regulatory environment in Zimbabwe influence drone adoption decisions?

15. What role should regulators such as the Civil Aviation Authority of Zimbabwe (CAAZ) play in supporting drone logistics innovation?

Section E: Strategic and Future Outlook

16. How could drone technology influence your organisation's competitive position?

17. What partnerships or collaborations would be necessary to support drone adoption?

18. In your opinion, is drone technology a viable long-term solution for last-mile logistics in Zimbabwe? Why or why not

COMPANY PROFILE

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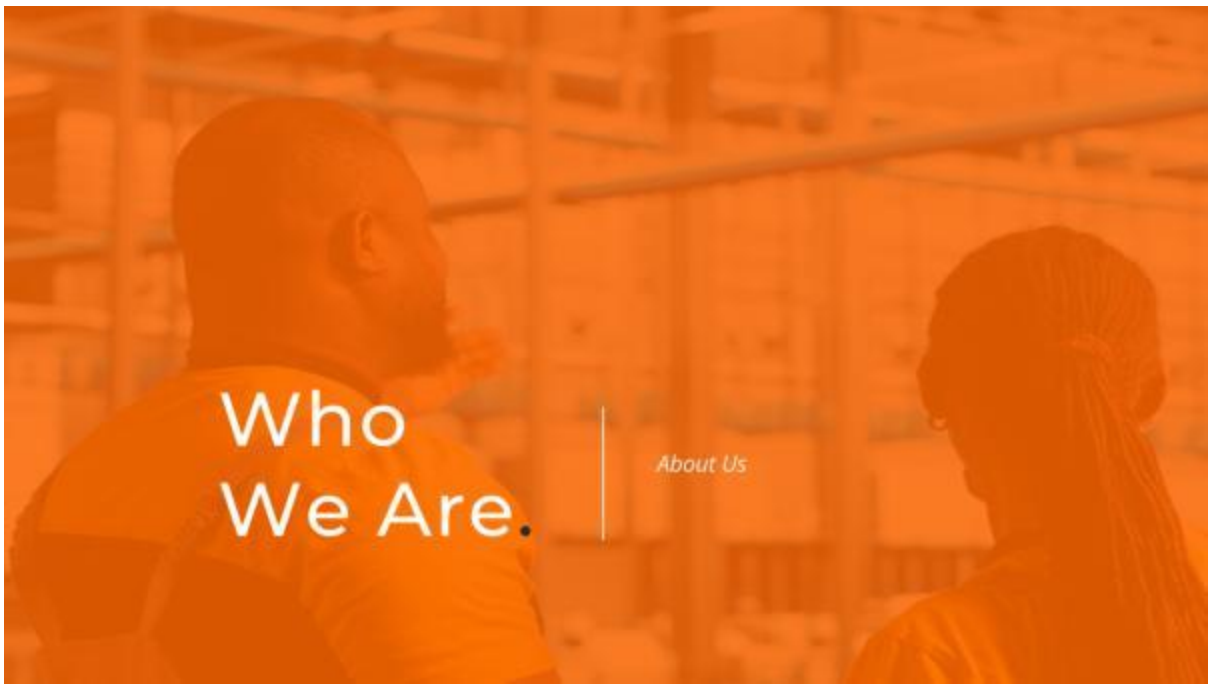

About Us

CHARLIE STEVENS INTERNATIONAL

Charlie Stevens International (CSI) is an international logistics company providing customs clearance, freight forwarding, logistical support, warehousing and distribution at a global scale.

Our innovative solutions are geared to provide world class logistics solutions. CSI has a grass roots background in Zimbabwe.

The Aim of this organization is to provide logistics solutions for countries such as Zimbabwe, South Africa, Mozambique, Malawi, Zambia and the rest of the region in Africa and beyond Africa.

Our Vision and Mission

Our Vision

To be global leaders in the delivery of logistical services to the delight of our customer.

Our Mission

Providing excellent logistics services.

Our Values

Customer Centric: We place our customers at the heart of everything we do, ensuring their needs guide our decisions and service delivery. **Integrity:** We operate with honesty, transparency, and strong ethical principles in every interaction. **Delivery:** We are committed to consistent, reliable execution, delivering quality results on time and to standard. **Relationships:** We build and nurture long-term, meaningful relationships with our clients, partners, and stakeholders based on trust and mutual respect.

What We Do.

Products & Services

CHARLIE STEVENS INTERNATIONAL

CUSTOMS CLEARANCE

Our Customs Clearance service facilitates the smooth movement of cargo for both imports and exports. We handle tariff classifications, costings, and submit Bills of Entry through the ZIMRA ASYCUDA system, while providing daily shipment updates and clear customer communication to ensure efficient, compliant, and competitive cargo movement.

Services include: Import & Export Customs Clearing, Removal In Bond (RIB), Removal In Transit (RIT), Bonded Warehousing, Capital Goods Rebate (CGR), Diplomatic Rebate, Returning Resident (RR) applications, and Temporary Import Permits (ATIP).

CHARLIE STEVENS INTERNATIONAL

FREIGHT FORWARDING

CSI facilitates road freight across Zimbabwe and the wider African region through a strong network of leading transport operators. We manage inbound and outbound shipments efficiently, offering fast, flexible, and environmentally responsible transport solutions.

Key Routes & Points of Entry:
Chirundu, Beitbridge, Plumtree, Nyamapanda, Forbes, Kazungula, and Harare International Airport.

CHARLIE STEVENS INTERNATIONAL

WAREHOUSING

CSI provides secure warehousing facilities with controlled access gates manned by security personnel, fully compliant with ZIMRA requirements under the Customs and Excise Act. We advise clients on the latest customs regulations, handle all customs formalities professionally, and apply for permits, licences, and rebate applications on behalf of our clients to ensure smooth, compliant operations.

CHARLIE STEVENS INTERNATIONAL

AIR FREIGHT

CSI provides reliable and time-sensitive air freight solutions for imports and exports through major airports, ensuring fast, secure, and efficient cargo movement. We manage end-to-end coordination, documentation, customs compliance, and real-time shipment updates, giving clients peace of mind and dependable delivery for urgent, high-value, and priority consignments.

CHARLIE STEVENS INTERNATIONAL

SEA FREIGHT

CSI delivers cost-effective sea freight solutions for imports and exports, coordinating cargo movement through major regional and international ports. We manage end-to-end logistics, documentation, customs compliance, and shipment tracking, providing reliable, scalable options for full container loads (FCL), less-than-container loads (LCL), and project cargo to meet diverse business needs.

CHARLIE STEVENS INTERNATIONAL

COURIER SERVICES

CSI offers fast, secure courier solutions for documents and small parcels, both locally and internationally. We provide reliable door-to-door delivery, tracking, and customs support where required, ensuring timely, hassle-free delivery for urgent and time-sensitive shipments.

Fleet Capacity

Our courier operations are supported by a dependable in-house fleet, including 3-tonne trucks, 2 T35 trucks, and 4 pickup trucks, as well as small service vehicles (1 Toyota Belta, 1 Toyota Aqua, and 2 Honda Fit Hybrid) to ensure flexible, efficient last-mile delivery.

CHARLIE STEVENS INTERNATIONAL

CONSULTING SERVICES

CSI provides expert consulting on customs and trade compliance, offering professional guidance on import and export procedures, documentation, and regulatory requirements. We assist clients with specialized applications, including **Returning Resident (RR) facilities**, rebates, permits, and regulatory approvals, ensuring compliant, cost-effective solutions and smooth clearance processes.

OUR Team.

Dedicated Professionals You Can Trust

Our Executive Team

Our Executive Team provides strategic leadership and industry expertise to deliver reliable, compliant, and customer-focused logistics and customs solutions. Guided by integrity and performance, the team drives excellence across all CSI operations.

CHARLIE STEVENS INTERNATIONAL

Chiedza Makwara Mswaka
Managing Director

Cynthia Dhambuza
Executive Assistant

Matida Makwara
Finance Executive

Lonald Chigede
Forwarding Manager

Our Operations Team

Our Operations Team is the engine of CSI, managing day-to-day logistics, customs clearing, freight coordination, and deliveries with precision and efficiency. With hands-on expertise and a strong service culture, the team ensures timely execution, compliance, and clear communication to keep our clients' cargo moving smoothly.

CHARLIE STEVENS INTERNATIONAL

Proud Nyamare
Operations Officer

Emisher Mutsadyanga
Marketing

Artwell Mawadze
Operations Officer

Albert Kache
Operations Officer

OUR Clients.

Trusted by Leading Brands and Businesses

CHARLIE STEVENS INTERNATIONAL

OUR CLIENTS

CHARLIE STEVENS INTERNATIONAL

Get In Touch With Us

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