

Assessing On-Demand Delivery's Impact on Service Quality in South Africa's Construction Material Industry using SERVQUAL

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ABSTRACT

The construction material industry is integral to economic growth, particularly in developing nations like South Africa. However, challenges in supply chain management (SCM), procurement inefficiencies, delivery services and evolving customer expectations necessitate the exploration of digital solutions. This study investigates the perceived impact of On-Demand Delivery (ODD) services on service quality (SQ) within South Africa's construction material industry, using the SERVQUAL model.

The research addresses a critical gap in understanding how digital delivery models affect service quality. The study is guided by the SERVQUAL framework, which evaluates five key service quality dimensions, viz, Tangibles, Reliability, Responsiveness, Assurance, and Empathy to determine their influence on ODD effectiveness in construction material supply chains.

A quantitative research approach was employed, utilizing a structured questionnaire distributed via online platforms to a sample population of South African consumers engaged in construction projects over the past three years. Responses from 140 participants were analysed using Structural Equation Modelling (SEM) to assess the relationships between SERVQUAL constructs and overall service quality.

Key findings indicate that Empathy ($\beta = 0.702$, $p < 0.001$) and Reliability ($\beta = 0.428$, $p < 0.001$) have the strongest positive impact on perceived service quality, suggesting that personalized service interactions and dependable delivery schedules significantly impacts service quality and ultimately enhances customer satisfaction and loyalty. Responsiveness ($\beta = 0.335$, $p = 0.006$) and Assurance ($\beta = 0.143$, $p = 0.035$) also contribute positively but to a lesser extent. Tangibles, while positively perceived, do not significantly impact overall service quality ($p = 0.871$).

The study concludes that ODD services play a pivotal role in improving service quality in the construction material industry, with reliability, responsiveness, and empathy emerging as key drivers. The findings provide potential valuable insights

for business owners, supply chain managers, and policymakers seeking to optimize digital logistics and customer-centric service strategies. Future research is recommended to explore regional variations, cost implications, and regulatory considerations in ODD adoption.

KEYWORDS

construction, material, supply chain management (SCM), on-demand delivery (ODD), e-procurement, e-ticketing, tangibles, reliability, responsiveness, assurance, empathy, SERVQUAL, service quality, customer satisfaction, Structural Equation Model (SEM).

DECLARATION

I, Sello Madiba (678472), declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Management in the field of Digital Business at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Name: Sello Madiba

Signature: 

Signed at: Little Falls, Roodepoort

On the 28th day of February 2025

DEDICATION

This research paper is dedicated with love and deep respect to my late grandparents: Ngoanaletaga Josephina Madiba, Makgere Melita Molepo-Letsoalo, and Maboke Titus Letsoalo. Your unwavering strength, wisdom, and kindness have left an indelible mark on my life. Though you are no longer with me in person, your guidance and values continue to inspire me every day. This work is a tribute to your legacy, a reflection of the love and lessons you instilled in me.

I carry your memories in my heart, always.

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LIST OF ACRONYMS

Table 1: List of acronyms

ACRONYM	DESCRIPTION
SERVQUAL	Service Quality
ODD	On-Demand Delivery
3PL	Third-Party Logistics
GSCM	Green Supply Chain Management
MENA	Middle East and Northern Africa
SCM	Supply Chain Management
SSA	Sub-Saharan Africa
y-o-y	year-on-year
DORMT©	Digitalization Opportunities Road Mapping Tool
IoT	Internet of Things
BT	Blockchain Technology
SEM	Structural Equation Modelling
SD	Standard Deviation

Note: Table compiled by author

CHAPTER 1. INTRODUCTION

1.1 Statement of purpose

This quantitative study aims to investigate the perceived impact of on-demand delivery (ODD) services on service quality in South Africa's construction material industry, using the SERVQUAL model. The research will specifically assess how ODD services influence service quality within the framework of SERVQUAL's five dimensions.

1.2 Background of the study

The construction industry is crucial to the financial stability and economic growth of all countries, especially developing ones (Ogunnusi et al., 2021). According to Ogunnusi et al. (2021), this industry represents a significant portion of national economies and is vital for ongoing economic activities. As a critical component of global economic development, the construction materials sector plays a pivotal role in supporting infrastructure projects across continents, driving development and modernization efforts worldwide (Ogunnusi et al., 2021).

This section will explore the construction materials sector from three distinct perspectives. First, it will provide an overview of the global construction environment, highlighting key trends, growth drivers, and market dynamics. Then, it will narrow the focus to Africa, examining the unique challenges and opportunities faced by the continent's construction sector. Finally, the discussion will delve into South Africa's construction materials industry, offering detailed insights into its current state, significant trends, and future prospects. Through this multi-layered analysis, the aim is to provide a comprehensive understanding of the construction materials landscape and its pivotal role in shaping modern infrastructure.

1.2.1 Construction Material Industry from a Global Perspective

The global construction materials industry is positioned for steady growth in the coming decade, driven by various regional dynamics and economic factors (*Global Infrastructure Report - Q2 2024*, 2024). As of the latest forecast, the industry is expected to experience an average annual real growth rate of 3.1% between 2026 & 2028 and maintain an average annual growth rate of 2.9% through to 2033 (*Global Infrastructure Report - Q2 2024*, 2024). This sustained expansion is underpinned by a combination of economic recovery, increased infrastructure investment, and ongoing urbanization and industrialization in emerging markets (*Global Infrastructure Report - Q2 2024*, 2024).

Overall, the global construction materials industry is set to benefit from a supportive macroeconomic environment, increased infrastructure spending, and ongoing demand for construction projects (*Global Infrastructure Report - Q2 2024*, 2024). However, challenges like geopolitical risks, inflation, and tighter monetary policies in some regions could hinder growth (*Global Infrastructure Report - Q2 2024*, 2024). In this industry, the supply chain component is a complex network involving multiple stakeholders including suppliers, manufacturers, contractors, and logistics providers (Hanh et al., 2024). Efficient supply chain management (SCM) is crucial for the timely and cost-effective delivery of materials to construction sites (Hanh et al., 2024). Hanh et al. (2024) further states that the supply chain network faces challenges from transportation logistics, inventory management, and coordination among procurement parties.

The COVID-19 pandemic exposed vulnerabilities in the construction materials supply chain, leading to a re-evaluation of strategies to enhance resilience due to issues like border closures, transportation disruptions, and health regulations (Hanh et al., 2024). These challenges highlighted the need for proactive SCM, flexible project planning, and the adoption of digital tools to mitigate risks and ensure material supply continuity (Hanh et al., 2024; Ogunnusi et al., 2021).

1.2.2 Construction Material Industry in Africa

The construction materials industry in Africa, notably in North Africa is experiencing growth, driven by large-scale infrastructure projects and economic diversification efforts (*Middle East And North Africa Infrastructure Report - Q2 2024*, 2024). The region is expected to experience real growth in the construction industry, with Libya leading at 16.5% year-on-year in 2024, driven by reconstruction efforts after years of civil unrest and economic decline (*Middle East And North Africa Infrastructure Report - Q2 2024*, 2024). Egypt stands out among larger markets with major infrastructure projects, such as the Ain-Sokhna-Marsa Matrouh High-Speed Rail, and a strong push for privatization, attracting local and foreign investments (*Middle East And North Africa Infrastructure Report - Q2 2024*, 2024).

The construction materials industry in Sub-Saharan Africa (SSA) is set to experience significant growth over the next decade (*Sub-Saharan Africa Infrastructure Report - Q2 2024*, 2024). The region is projected to achieve an average annual construction growth of 5.4% from 2024 to 2033, making it the fastest-growing globally, though below its 2010-2019 rate of 8.7% (*Sub-Saharan Africa Infrastructure Report - Q2 2024*, 2024). This growth will be driven by strong demographic trends, including a booming population and rapid urbanization, boosting demand for residential construction, energy, and transport infrastructure (*Sub-Saharan Africa Infrastructure Report - Q2 2024*, 2024).

Sub-Saharan Africa Infrastructure Report - Q2 2024 (2024) states that East and West African regions are expected to be the main contributors to this growth, with markets such as Côte d'Ivoire and Tanzania predicted to be global outperformers. For instance, Tanzania's construction industry is expected to grow at an average annual rate of 7.4%, driven by significant investments in transport infrastructure, including the Tanzania Standard Gauge Railway and various road and port projects (*Sub-Saharan Africa Infrastructure Report - Q2 2024*, 2024).

A study by Bouhmoud et al. (2023) indicated Africa's construction materials industry is positioned for strong growth, driven by infrastructure investments and

demographic trends, while adapting to post-pandemic realities and opportunities. Overall, the industry in Africa is poised for significant growth driven by both traditional infrastructure projects and innovative green energy initiatives which will help in driving regional growth for a diversified and resilient economic future (*Middle East And North Africa Infrastructure Report - Q2 2024, 2024*),(*Sub-Saharan Africa Infrastructure Report - Q2 2024, 2024*).

1.2.3 Construction Material Industry in South Africa

The construction materials industry in South Africa is poised for both opportunities and challenges, as highlighted in the *South Africa Infrastructure Report - Q2 2024* (2024). In 2023, the industry grew by an estimated 0.9% y-o-y, with growth constrained by weak activity in both residential and non-residential building sectors and increased policy uncertainty ahead of the 2024 elections, deterring private infrastructure investment (*South Africa Infrastructure Report - Q2 2024, 2024*). South Africa, reported to be the largest market in SSA, experienced six consecutive years of negative construction growth from 2016 to 2022 (*Sub-Saharan Africa Infrastructure Report - Q2 2024, 2024*). However, the industry is expected to see moderate growth soon, driven by government interventions, private investments, and ongoing infrastructure projects (*South Africa Infrastructure Report - Q2 2024, 2024*).

A study by Dithebe et al. (2022) highlighted that the construction materials industry in South Africa faces significant challenges, worsened by policy uncertainty, corruption, and the COVID-19 pandemic. The authors noted that South Africa's economic challenges, including poor governance and financial constraints, have impacted the construction industry, with the pandemic intensifying these issues and further slowing growth and productivity (Aigbavboa et al., 2022; Dithebe et al., 2022). A study by Aigbavboa et al. (2022) noted that the nationwide lockdown to curb the virus halted most on-site construction activities, as the industry heavily relies on hands-on operations and was slow to adopt remote working technologies.

According to Dithebe et al. (2022), corruption significantly hinders timely and cost-effective construction projects. The lack of stable governance has reduced investor confidence and funding, while the public sector lacks the resources, skills, and technology to efficiently manage construction projects (Dithebe et al., 2022). Despite these challenges, there is hope for the industry's recovery and growth as the industry's value is forecasted to increase from ZAR152.4 billion in 2023 to ZAR234.4 billion by 2033 (*South Africa Infrastructure Report - Q2 2024*, 2024).

Taking a closer look at the supply chain of construction materials in South Africa, Selepe and Makinde (2024) highlighted that it faces significant challenges, including long lead times, inventory stock-outs, process deviations, and unreliable ERP systems. Poor management decisions, ineffective policies, low employee morale, and lack of job rotation further hinder supply chain efficiency, impacting decision-making and strategic planning in the construction industry (Selepe & Makinde, 2024). Mvubu and Naude (2024) noted that South Africa's construction supply chain has significantly transformed due to digital technologies and green supply-chain management (GSCM) practices. The adoption of digital technologies by third-party logistics (3PL) providers is a key driver, enhancing efficiency, sustainability, and competitiveness in a complex market (Mvubu & Naude, 2024).

However, beyond technological adoption, the construction material supply chain in South Africa is still plagued by deep-rooted operational risks (Alabi & Fapohunda, 2021; Naicker et al., 2018). As Naicker et al. (2018) observe, supply risks are prevalent and often stem from poor supplier selection, corruption in the form of nepotism, and lack of information sharing. These risks disrupt project timelines, inflate costs, and threaten project quality (Naicker et al., 2018). Companies frequently neglect due diligence and performance monitoring, which increases vulnerability to material delays and defective supplies (Naicker et al., 2018).

Similarly, Alabi and Fapohunda (2021) underscore the impact of rising material costs driven by inflation, supply-demand imbalance, and material scarcity. These cost escalations trigger fluctuations in project budgets and often result in project

delays or abandonment (Alabi & Fapohunda, 2021). The broader implications include increased maintenance costs, contractor fraud, and rising unemployment in the sector, further weakening the industry's contribution to economic development (Alabi & Fapohunda, 2021).

A study by Ogundipe et al. (2024) reinforces these findings by identifying weak procurement strategies, unclear project specifications, delays in material delivery, and poor project planning as systemic weaknesses in the supply chain. Inadequate integration of digital systems, poor communication, and limited understanding of SCM concepts among subcontractors compound the inefficiencies (Ogundipe et al., 2024). Additionally, factors such as extreme weather and political interference, as well as the chronic underestimation of material costs, contribute to recurring disruptions (Ogundipe et al., 2024).

Moreover, Windapo and Cattell (2013) point to the soaring costs of materials, driven by factors like import duties, VAT, logistics, and manufacturing costs as a key constraint on the industry's development. High enterprise failure rates and limited public sector capacity, particularly delays in approvals and funding processes, further weaken the sector's ability to respond efficiently to supply chain challenges (Windapo & Cattell, 2013).

On the other hand, Chinomona and Bikissa-Macongue (2022) highlighted that increasing environmental concerns are driving construction companies to adopt sustainable practices in SCM, leading to a shift towards GSCM. In Gauteng province, regulatory pressures, green information systems, green packaging, and reverse logistics are key factors (Chinomona & Bikissa-Macongue, 2022). Green packaging minimizes environmental impact, while reverse logistics focuses on the reuse, recycling, or disposal of products, enhancing logistics performance and sustainability in South Africa's construction industry (Chinomona & Bikissa-Macongue, 2022). Despite this momentum towards sustainability, successful GSCM implementation in South African construction still remains challenging (Rukuni et al., 2022).

Overall, the construction materials industry in South Africa faces both opportunities and challenges, as detailed in the South Africa Infrastructure Report

- Q2 2024 (2024). South Africa, being the largest market in SSA, experienced six consecutive years of negative growth from 2016 to 2022. Nonetheless, moderate growth is anticipated in the near future, driven by government interventions, private sector investments, and ongoing infrastructure projects (*South Africa Infrastructure Report - Q2 2024*, 2024).

The next section will formally introduce and unpack the problem and knowledge gap aimed to be addressed by this research.

1.3 Research problem

The South African construction materials industry's supply chain and procurement processes have seen significant changes due to the adoption of digital technologies, which are essential for improving efficiency, sustainability, and competitiveness in a complex market (Mvubu & Naude, 2024). Despite these advancements, South African stakeholders in the construction materials industry still face challenges in fully implementing and measuring the impact of digital solutions to aspects such as customer satisfaction and by extension, service quality (Mvubu & Naude, 2024; Selepe & Makinde, 2024). Customer satisfaction is defined as a key business metric that measures the extent to which the goods and services provided by a company align with and fulfil customer expectations (Roslan et al., 2015).

This study will aim to address the critical need to explore how digitally optimized supply chain models, particularly ODD services, affect service quality within the industry. Furthermore, there is a notable gap in understanding the specific impact of ODD services on service quality as perceived by end-users of construction materials (Hanh et al., 2024). Although existing research underscores the importance of efficient SCM, the direct relationship between the service quality of ODD services and customer satisfaction in the construction materials sector remains unexplored (Hanh et al., 2024).

By addressing these gaps, this research aims to provide a comprehensive understanding of how ODD services influence service quality and ultimately customer satisfaction in the construction material industry in South Africa.

1.4 Research questions

The main research question guiding this study is:

1. Is there a statistically significant relationship between ODD services and service quality in the South African construction material industry?

To address this overarching question, the following sub-questions will be examined:

- 1.1. To what extent do tangibles in ODD services influence service quality in the South African construction material industry?
- 1.2. How much does the reliability of ODD services affect service quality in the South African construction material industry?
- 1.3. How much impact does responsiveness in ODD services have on service quality in the South African construction material industry?
- 1.4. To what extent does assurance in ODD services influence service quality in the South African construction material industry?
- 1.5. To what degree does empathy in ODD services contribute to service quality in the South African construction material industry?

1.5 Rationale

This research will aspire to offer valuable insights into digital technology practices and their application within the construction materials industry in South Africa. According to Kikwasi et al. (2023), Mvubu and Naude (2024), and Selepe and Makinde (2024), digitally optimized supply chain and procurement models enable a significant technological advancement that can revolutionize traditional supply chain operations. By examining the integration of ODD services in the construction material industry, this report will seek to provide a clearer understanding of their impact on service quality. This, in turn, could inform best practices and strategic planning for businesses looking to leverage technology to enhance their operations as noted by (Kikwasi et al., 2023; Selepe & Makinde, 2024).

Several stakeholders from the construction material industry in South Africa may benefit significantly from this research. While there has been extensive research on the impact of ODD services in industries like food delivery and ride-sourcing as stated by Harter et al. (2024), and Liu and Li (2023), there is a notable lack of research focused on their application and impact in South Africa's construction material industry. This research will aim to contribute a perspective to the existing body of knowledge on this research subject, offering relevant data and insights tailored to the unique challenges and opportunities present in South Africa.

The findings of this research may be invaluable for business owners and managers within the construction materials sector. By understanding how ODD services can enhance service quality, these stakeholders may be equipped to make informed decisions about integrating and utilizing such services into their supply chains. This could lead to more streamlined operations, better resource allocation, and improved competitive positioning in the market (Kikwasi et al., 2023). For supply chain managers, this research may provide practical insights into optimizing logistics and delivery processes. Understanding the economic benefits and operational impacts of ODD services could help them design more efficient supply chains, reducing delays and improving overall service delivery, which are among common supply chain challenges as highlighted by Selepe and Makinde (2024). End-users, including construction companies and individual consumers, could benefit from understanding the extent to which ODD services can improve operational efficiency and cost-effectiveness during their projects.

Policy makers and industry regulators may also benefit from this research by gaining a deeper understanding of how technological advancements in delivery services can impact the construction materials industry. This could then inform policy decisions and regulatory frameworks that support the adoption of beneficial technologies while ensuring fair competition and consumer protection ("Consumer rights and consumer protection in the digital age," 2022; Tache, 2023).

Without this report, there could be a limited contribution to the body of knowledge on this subject from the dual perspectives of industry and geographical context. Consequently, stakeholders in South Africa's construction industry may lack the

literature and information necessary to adopt solutions that enhance service quality in construction material delivery. This research thus holds significant potential to drive positive change and innovation within the construction material industry in South Africa.

1.6 Delimitations of the study

This research is delimited to specific aspects within the South African construction material industry. The boundaries of the study are as follows:

- I. The research focuses on the South African construction material industry, targeting stakeholders involved in personal, residential, commercial, and industrial projects, whether new, ongoing, or maintenance based.
- II. It includes participants who have been engaged in construction projects within the last three years.
- III. The research only considers the following material types; Aggregates, Cement and Concrete products, Bricks and Masonry, Metals, Wood Products, Plastics and Composites, and Finishing materials.

1.7 Definition of terms

Below is the definition of key terms in this research study:

1. On-Demand Delivery Services: This refers to transportation services for construction materials that provides immediate or scheduled delivery of construction materials directly to a job site, warehouse, or another specified location (Alanazi et al., 2022). Unlike traditional delivery methods, which may require advance scheduling and longer lead times, on-demand delivery services are designed to be flexible, fast, and

responsive to the immediate needs of construction projects (Addy et al., 2023; Alanazi et al., 2022)

2. Customer Satisfaction: This refers to the key business metric that measures the extent to which the goods and services provided by a company align with and fulfil customer expectations (Roslan et al., 2015).
3. Service Quality: This is described as the degree of excellence of a product or service, reflecting its suitability and effectiveness for the intended use (Roslan et al., 2015)
4. Tangibles: Physical facilities, equipment, and appearance of personnel (Parasuraman et al., 1988)
5. Reliability: Ability to perform the promised service dependably and accurately (Parasuraman et al., 1988)
6. Responsiveness: Willingness to help customers and provide prompt service (Parasuraman et al., 1988)
7. Assurance: Knowledge and courtesy of employees and their ability to inspire trust and confidence (Parasuraman et al., 1988)
8. Empathy: Caring, individualized attention the firm provides its customers (Parasuraman et al., 1988)

1.8 Assumptions

Several assumptions listed below could influence the outcome of the research:

1. It is assumed that all consumers have similar expectations regarding service quality, tangibles, reliability, responsiveness, assurance empathy and customer satisfaction.
2. It is assumed that respondents answered the questionnaire accurately and honestly to report their experiences and perceptions, without bias or exaggeration.
3. The research assumes that market conditions, such as pricing, competition, and consumer demand, remain relatively stable throughout the study.

4. It is assumed that the findings from the selected sample of construction material consumers in South Africa can be generalized to a broader population.
5. Service quality is generally assumed to have a directly proportional relationship with customer satisfaction, meaning that as service quality improves, customer satisfaction increases (Arlı et al., 2024; Yusra & Agus, 2020). Additionally, customer satisfaction is found to influence customers' intentions to use or reuse an online platform service, as their decision is driven by their satisfaction with the quality of the offering (Annaraud & Berezina, 2020).

CHAPTER 2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Introduction

This section presents a literature review which lays the foundation for this research's hypotheses. The section explores the background and definition of key topics at hand, establishing the context for further discussion. Subsequently, the review delves into five key constructs of service quality relevant to the study, viz: Tangibles, Reliability, Responsiveness, Assurance, and Empathy. Each construct is introduced and discussed in relation to its significance in this report and based on the insights and gaps identified in the existing literature, specific hypotheses are formulated for each construct. This approach aims to ensure a thorough understanding of how each dimension of service quality contributes to the overall research questions, paving the way for empirical investigation.

2.2 Background discussion

The integration of digital technologies such as data analytics, blockchain technology (BT), the Internet of Things (IoT), and electronic ticketing (e-ticketing) has been pivotal in enhancing service quality in construction material SCM (Gebretekle et al., 2022; Hallikas et al., 2021; Kang et al., 2023; Monnagaaratwe & Mathu, 2022; Patil & Bhaumik, 2023; Selepe & Makinde, 2024; Subramanya et al., 2023). ODD Services refer to transportation solutions designed to provide immediate or scheduled delivery of construction materials directly to job sites, warehouses, or other specified locations (Alanazi et al., 2022). Unlike traditional delivery methods that often require advance scheduling and longer lead times, ODD services offer greater flexibility, speed, and responsiveness to the dynamic needs of construction projects (Addy et al., 2023; Alanazi et al., 2022).

A key factor in evaluating the effectiveness of these services in the construction material delivery industry is customer satisfaction, which measures the extent to which the provided goods and services meet or exceed customer expectations,

reflecting the overall service quality (Roslan et al., 2015). Closely related to this is Service Quality, which is defined as the degree of excellence of a product or service, indicating its suitability and effectiveness for the intended purpose (Roslan et al., 2015). Tangibility in digitally enabled delivery services is represented through the physical evidence of technology use, such as e-ticketing systems and IoT devices that monitor material conditions in real-time (Patil & Bhaumik, 2023; Subramanya et al., 2023). These technologies enhance the visibility and traceability of construction materials, ensuring stakeholders can verify the status and quality of deliveries.

The concept of tangibles extends beyond digital interfaces and includes physical infrastructure, the condition of materials, and the vehicles used in the delivery process (Nolz, 2021; Parasuraman et al., 1988). Nolz (2021) highlights the critical role of tangible elements by optimizing delivery vehicle usage not only to reduce congestion and delays but also to improve the visual presentation and physical condition of construction materials upon arrival. Despite their functional importance, some studies suggest that tangibles may exert a relatively weaker influence on perceived service quality in specific contexts (Cho et al., 2021). For instance, Cho et al. (2021) found that in rural last-mile delivery environments, tangibles such as pickup facility quality and the proximity of delivery nodes had the weakest indirect effect on customer satisfaction.

In the South African context, Aghimien et al. (2019) indirectly link tangible elements such as infrastructure quality and physical coordination among suppliers to improved delivery planning and logistical execution. While tangibles were not the primary focus of their study, the findings suggest that visible, physical enhancements in supply chain logistics contribute to smoother operations and can reinforce confidence among stakeholders in material delivery processes (Aghimien et al., 2019).

On the other hand, Reliability is significantly improved through data analytics and BT, which optimize procurement and inventory processes, ensuring consistent and timely material availability (Hallikas et al., 2021; Monnagaaratwe & Mathu, 2022). Monnagaaratwe and Mathu (2022) emphasize that robust supply chain collaboration and logistics optimization reduce delays and increase the

dependability of service delivery. This aligns closely with a study by Nolz (2021) which define reliability in ODD and last-mile delivery as the ability to consistently deliver accurate and timely services. Nolz (2021) underscores that one of the major contributors to construction project delays is uncoordinated and inconsistent delivery scheduling. To address this, the study proposes a two-level integrated optimization model designed to align material deliveries with construction schedules in urban environments (Nolz, 2021). By accounting for spatial and logistical constraints, the model ensures that construction materials arrive at the right time and in the correct quantities, significantly enhancing delivery reliability (Nolz, 2021).

Similarly, Prachyathawornkul et al. (2023) propose a Mixed-Integer Linear Programming (MILP) optimization model that strategically manages multiple materials, delivery vehicles, and various logistical constraints. This model supports accurate order fulfilment and on-time deliveries, making it a critical tool for enhancing the reliability of logistics operations in complex construction supply chains (Prachyathawornkul et al., 2023). Further highlighting the centrality of reliability, Cho et al. (2021) demonstrate that in rural delivery contexts, where infrastructure is limited and delivery failures carry greater risks, reliability is a primary determinant of customer satisfaction and perceived service value. From a South African context, Aghimien et al. (2019) identify strategic planning and the quality of supplier relationships as foundational to achieving reliable material deliveries. The study stresses that the selection of capable suppliers and the fostering of long-term partnerships are instrumental in avoiding disruptions and ensuring consistent service performance (Aghimien et al., 2019).

Together, these insights reflect that reliability in the construction material industry is a multi-faceted construct influenced by planning, technology, optimization models, and supplier collaboration (Aghimien et al., 2019; Cho et al., 2021; Hallikas et al., 2021; Monnagaaratwe & Mathu, 2022; Nolz, 2021; Prachyathawornkul et al., 2023).

Responsiveness is enhanced through real-time decision-making facilitated by IoT systems and data analytics, enabling rapid adjustments to supply chain disruptions (Gebretekle et al., 2022; Patil & Bhaumik, 2023). The DORMT© tool introduced by Gebretekle et al. (2022) exemplifies how digital initiatives can prioritize resource allocation for quicker responses to operational challenges. In addition to technological advancements, the literature emphasizes the broader strategic and organizational dimensions of responsiveness in construction logistics (Nolz, 2021).

Nolz (2021) integrates responsiveness through an operational strategy that enables bi-weekly schedule updates to address ongoing supply chain fluctuations. This strategy significantly improves delivery agility and responsiveness to evolving site demands and external constraints (Nolz, 2021). Furthermore, Prachyathawornkul et al. (2023) illustrate how dynamic delivery planning can flexibly adapt to daily demand variations, allowing construction projects to maintain continuity even under changing logistical conditions.

As Cho et al. (2021) argue, fast and flexible delivery options, along with real-time problem-solving capabilities, are essential for meeting customer expectations, especially for clients operating in remote or less accessible sites. In the South African context, Aghimien et al. (2019) emphasize that responsiveness also relies on internal practices, such as empowering employees and establishing effective communication systems. These practices allow delivery teams to make prompt and informed decisions, reinforcing responsiveness at the organizational level and ensuring greater alignment with project timelines and client needs (Aghimien et al., 2019; Cho et al., 2021; Gebretekle et al., 2022; Nolz, 2021; Patil & Bhaumik, 2023; Prachyathawornkul et al., 2023).

With respect to Assurance, (Kang et al., 2023) states that it can be bolstered by the transparency and security provided by BT, fostering trust among stakeholders. Similarly, Addy et al. (2023) assert that effective digital procurement systems support assurance by standardizing workflows and minimizing human error. Although Nolz (2021) and Prachyathawornkul et al. (2023) do not explicitly evaluate assurance from a SERVQUAL perspective, their logistics optimization models for building material delivery indirectly reinforce the

importance of this dimension. By reducing delivery errors and improving service predictability through automated scheduling and structured planning, these models enhance customer confidence in service delivery (Nolz, 2021; Prachyathawornkul et al., 2023).

Aghimien et al. (2019) contribute to this understanding by identifying employee training and participation in decision-making as critical to fostering assurance. Their findings suggest that well-informed and involved workers are better equipped to provide consistent and high-quality service, reinforcing trust across the construction material supply chain (Aghimien et al., 2019).

Lastly, Empathy, while less directly influenced by technology, benefits from improved communication channels and stakeholder relationships enabled by digital tools (Hanh et al., 2024; Sahu et al., 2023). These advancements allow relevant stakeholders involved in construction material delivery to better understand and respond to client needs, enhancing service quality. Several studies have implicitly demonstrated how empathetic service delivery is operationalized through customization and flexible service features, Prachyathawornkul et al. (2023), for instance, emphasize the tailoring of delivery systems to align with specific product and customer requirements. This includes aligning delivery vehicles with material characteristics and offering split deliveries to accommodate client schedules and space limitations (Prachyathawornkul et al., 2023). Similarly, Cho et al. (2021) highlight the importance of delivery flexibility and location accessibility, noting that offering proximity to pick up points can significantly enhance user satisfaction, particularly in remote or rural areas where access is often limited.

Further reinforcing this construct, Aghimien et al. (2019) underscore the significance of a customer-centric philosophy throughout the delivery lifecycle. They advocate for an approach where service providers actively seek to understand client expectations, thereby enabling more informed, timely, and empathetic responses (Aghimien et al., 2019). Although Nolz (2021) does not explicitly refer to empathy, the study's emphasis on reducing logistical disruptions and delivery delays, especially in high density urban areas indirectly contributes

to this dimension by showing a concern for minimizing the negative impact on stakeholders and the broader construction workflow.

As evidenced by the literature reviewed above, the cumulative impact of digital enhancements in the construction material supply chain is reflected in improved customer satisfaction, driven by more reliable, responsive, and transparent service delivery (Addy et al., 2023; Gurgun et al., 2024; Kikwasi et al., 2023). However, while technology plays a critical role in aligning service delivery with SERVQUAL dimensions, it must be understood within the contextual realities of the South African construction material industry, which presents additional unique challenges of its own (Alabi & Fapohunda, 2021; Naicker et al., 2018).

Empirical insights from Naicker et al. (2018) and Alabi and Fapohunda (2021) highlight persistent inefficiencies in procurement processes, supplier management, and material quality control, which manifest as frequent material delivery delays, an issue that directly undermines the reliability and responsiveness dimensions central to ODD effectiveness. Inaccurate supplier selection practices further increase lead times and erode the assurance and responsiveness expected in ODD frameworks (Naicker et al., 2018). Moreover, the recurring use of substandard materials to cut costs, as reported by Alabi and Fapohunda (2021), diminishes the tangible quality of construction outputs, resulting in rework, higher maintenance expenses, and structural concerns. Such quality lapses degrade client satisfaction and trust, affecting not only the tangibles but also the empathy and assurance dimensions of service quality (Alabi & Fapohunda, 2021; Naicker et al. (2018).

Furthermore, both studies highlight procurement-related delivery risks, including delayed ordering, poor planning, and insufficient coordination among stakeholders, which compromise the accuracy and flexibility essential for effective delivery systems (Alabi & Fapohunda, 2021; Naicker et al., 2018). Addressing these systemic issues requires a holistic strategy that integrates supplier audits, improved contractor training, local sourcing, and the adoption of structured, digitally supported procurement methods (Alabi & Fapohunda, 2021; Naicker et al., 2018).

While digital transformation holds significant promise for enhancing service quality through alignment with SERVQUAL dimensions, the effectiveness of such advancements in the South African context must be considered alongside deeply rooted and inherent procurement and delivery challenges (Alabi & Fapohunda, 2021; Naicker et al., 2018). Bridging this gap demands coordinated reforms in procurement strategies, supplier accountability, and logistics planning ensuring that ODD services can operate efficiently and meet client expectations within the dynamic and often unpredictable environment of South Africa's construction sector (Alabi & Fapohunda, 2021; Naicker et al., 2018).

The subsequent sections of the literature review delve into the five key constructs of service quality, further emphasizing their significance to this report and formulating specific hypotheses based on each construct.

2.3 Tangibles Construct

Service quality can be further dissected through dimensions such as tangibles, which refer to physical aspects like facilities, equipment, and the appearance of personnel (Parasuraman et al., 1988). In the context of online businesses, tangibility extends to digital platform navigation, interactions with delivery personnel, and the physical handling of products (Arli et al., 2024).

Arli et al. (2024) states that positive consumer experiences across the five service quality dimensions underpinning the SERVQUAL model significantly enhance customer loyalty and satisfaction. This, in turn, could foster referrals and repeat business, ultimately contributing to increased market share, business growth, and enhanced profitability (Arli et al., 2024).

In addition to what has been stated above regarding tangibles, Ngaliman et al. (2019) further state that, as physical elements utilized by organizations to facilitate service delivery; including supporting equipment, employee appearance, and service environments, they contribute to lasting consumer impressions. The presence of well-maintained facilities and professional staff has been shown to positively influence customer perceptions, thereby enhancing customer satisfaction (Ngaliman et al., 2019).

In the context of ODD services within the construction material industry, customers encounter tangibility through interactions such as navigating online platforms to place orders, engaging with delivery personnel during the fulfilment process, and physically receiving and inspecting delivered materials (Arli et al., 2024). These tangible touchpoints are critical in shaping service quality, as supported by prior research emphasizing the influence of tangible service elements on consumer perceptions (Arli et al., 2024; Yarimoglu, 2014).

Based on this reviewed literature, this research formulated the following hypothesis:

H_{1a}: There is a significant positive correlation between tangibles and service quality in the context of On-Demand Delivery within the construction material industry.

2.4 Reliability Construct

Another critical dimension is Reliability, which denotes the ability to perform promised services dependably and accurately, influenced by factors such as accountability and service quality (Arli et al., 2024; Parasuraman et al., 1988). Reliability has been identified as a critical determinant of customer satisfaction (Ngaliman et al., 2019). Ngaliman et al. (2019) argue that customers place greater value on the consistency and dependability of delivery services than just the response speed or physical tangibles.

Reliable service attributes, including accurate deliveries and the fulfilment of promises are perceived to enhance customer perceptions and overall satisfaction (Ngaliman et al., 2019). Zygiaris et al. (2022) further emphasize that reliability, as a fundamental dimension of service quality, is underpinned by accountability and the comprehensive quality of the service provided.

In the context of online purchases, Arli et al. (2024) supports what is stated by Saoula et al. (2023) that reliability is the most influential factor in fostering customer trust in e-commerce platforms. Specifically, within ODD Services, Arli et al. (2024) states that reliability encompasses elements such as accurate billing

and the assurance that products are delivered in pristine condition. Arli et al. (2024) reinforce this perspective, noting that reliability is not only a vital component of service quality but also a key driver of customer satisfaction and loyalty. Based on these insights, the following hypothesis was proposed:

H_{1b}: There is a significant positive correlation between reliability and service quality in the context of On-Demand Delivery within the construction material industry.

2.5 Responsiveness Construct

Responsiveness highlights a firm's willingness to assist customers promptly and effectively address their needs (Arli et al., 2024; Parasuraman et al., 1988). According to Ngaliman et al. (2019), responsibility within an organization refers to the behaviour of employees in acting promptly and conveying information in alignment with consumer needs. In the context of ODD services, employee responsiveness plays a crucial role in shaping consumer perceptions (Ngaliman et al., 2019). The ability ODD suppliers' employees to respond efficiently and effectively is positively assessed by consumers, thereby enhancing service capabilities and fostering customer satisfaction (Ngaliman et al., 2019).

Responsiveness is a particularly critical factor in ODD services, as time is a valuable commodity for consumers (Arli et al., 2024). According to Arli et al. (2024), a company's ability to meet consumers' time-sensitive demands promptly is essential for establishing and maintaining strong customer relationships, ultimately influencing its overall success. Furthermore, responsiveness, in conjunction with reliability and trust, is fundamental to ensuring high service quality and enhancing customer satisfaction (Arli et al., 2024).

Building on these insights from the literature, the following hypothesis was proposed:

H_{1c}: There is a significant positive correlation between responsiveness and service quality in the context of On-Demand Delivery within the construction material industry.

2.6 Assurance Construct

Assurance encompasses the knowledge, courtesy, and professionalism of employees, as well as their ability to inspire trust and confidence in customers (Parasuraman et al., 1988). This dimension also considers elements such as personalization, security, and system reliability in online environments Arli et al. (2024), while in supply chain contexts, trust in supplier capabilities and adherence to industry standards are vital (Zhang & Hou, 2013).

According to Fan et al. (2017), online platforms that are visually appealing and user-friendly significantly enhance repurchase intentions by providing a seamless and engaging experience. In the context of online supply chain services, assurance has emerged as a critical factor in shaping customer satisfaction (Mitropoulou & Tsoulfas, 2021). Mitropoulou and Tsoulfas (2021) emphasize that ensuring a high level of assurance through robust website security, well-trained employees, and reliable service can substantially enhance customer trust. These improvements not only address the gap between customer expectations and their actual experiences but also contribute to long-term customer loyalty and a sustainable competitive advantage (Mitropoulou & Tsoulfas, 2021).

Building upon these insights, the following hypothesis was proposed:

H_{1d} : There is a significant positive correlation between assurance and service quality in the context of On-Demand Delivery within the construction material industry.

2.7 Empathy Construct

Empathy reflects the provision of caring, individualized attention to customers (Parasuraman et al., 1988). In online service environments, empathy can be demonstrated through customizable, flexible, and personalized offerings (Arli et al., 2024). Zhang and Hou (2013) however, argue that empathy holds less relevance in SCM compared to traditional service industries, recent studies suggest that it can be enhanced through improved communication channels and

stakeholder relationships facilitated by digital tools (Hanh et al., 2024; Sahu et al., 2023).

Empathy has been identified as a crucial factor in shaping customer satisfaction, particularly in supply chain service-oriented industries (Mitropoulou & Tsoulfas, 2021). According to Mitropoulou and Tsoulfas (2021), customers place high expectations on the level of empathy exhibited by service providers, however, their actual experiences often fall short. This gap highlights an area for improvement, particularly in understanding and addressing specific customer needs (Mitropoulou & Tsoulfas, 2021).

Arli et al. (2024) further emphasize that the impact of empathy on customer satisfaction is further amplified when combined with respect. When service providers demonstrate genuine care and attentiveness, they can foster stronger customer relationships and enhance overall satisfaction (Arli et al., 2024). However, while empathy can serve as a powerful tool for building trust and rapport, Arli et al. (2024) caution against its excessive use. Overemphasizing empathy, particularly as a means of gaining favour, can have unintended consequences, leading to discomfort or awkwardness for the customer (Murray et al., 2019). These findings by Murray et al. (2019) underscores the necessity of maintaining an appropriate balance between empathy and professionalism to ensure a positive customer experience.

Based on these insights, the following hypothesis was proposed:

H_{1e} : There is a significant positive correlation between empathy and service quality in the context of On-Demand Delivery within the construction material industry.

2.8 ANALYTICAL FRAMEWORK

2.8.1 *Theoretical Framework*

The SERVQUAL Model framework presented in this section aims to contextualize the theory that underpins this research. A widely recognized multidimensional research instrument which was designed to assess consumer expectations and perceptions of service quality (Parasuraman et al., 1988). Despite its broad application, Arli et al. (2024) highlight that the approach of using SERVQUAL in business services, such as online food delivery services (OFDSs) and on-demand delivery services (ODDSs), remains underexplored. It identifies five key dimensions of service quality, viz: Tangibles, Reliability, Responsiveness, Assurance, and Empathy (Parasuraman et al., 1988).

The first dimension, tangibles, encompasses all physical aspects related to service delivery, including the appearance of personnel, the quality of materials, and the adequacy of equipment and communication platforms on consumers (Arli et al., 2024; Mitropoulou & Tsoulfas, 2021). Additionally, the effectiveness of digital platforms, such as mobile apps used for ordering and tracking deliveries, plays a crucial role in enabling users to assess service quality (Arli et al., 2024). Reliability, the second dimension, pertains to the accuracy and dependability of service execution (Parasuraman et al., 1988). In ODDS, reliability translates to the timely and accurate delivery of materials as per the customer's order specifications (Arli et al., 2024). Delays or errors in deliveries can disrupt construction projects, leading to cost overruns and inefficiencies (Hallikas et al., 2021; Selepe & Makinde, 2024).

The third dimension, responsiveness, measures the willingness of a firm to assist customers and provide prompt service (Parasuraman et al., 1988). In the context of ODDS for construction materials, responsiveness is reflected in a company's ability to handle customer inquiries swiftly, address last-minute changes, and provide real-time updates on delivery statuses (Arli et al., 2024). Assurance, the fourth dimension, involves the competence, courtesy, and credibility of service personnel (Mitropoulou & Tsoulfas, 2021). Based on what is stated by

Mitropoulou and Tsoufas (2021), assurance for ODDSs can be demonstrated through knowledgeable delivery personnel who understand handling procedures for various construction materials, as well as secure and transparent transaction processes.

The final dimension, empathy, focuses on the level of personalized attention and care that a company offers its clients (Parasuraman et al., 1988). In the ODDS sector, empathy involves understanding the unique requirements of construction customers and offering them convenient payment options (Mitropoulou & Tsoufas, 2021). As highlighted by Arli et al. (2024), despite SERVQUAL's extensive application across various industries, its use in evaluating online delivery services remains limited, making it an emerging area of study. Furthermore, Hanh et al. (2024) emphasize the critical importance of timely and reliable material delivery in the construction industry, highlighting that adopting measurement tools like SERVQUAL can provide valuable insights for improving service quality and customer satisfaction.

2.8.2 Conceptual Framework

The conceptual framework for this study is illustrated in Figure 1, which visually represents the hypothesized relationships between key service quality dimensions and overall service quality within the context of on-demand delivery (ODD) services in the construction material industry. The framework is built upon the theoretical foundation provided by literature reviewed in this section on service quality and customer satisfaction which elaborates the five critical constructs: tangibles (TAN), reliability (REL), responsiveness (RES), assurance (ASS), and empathy (EMP).

Below is the figure which depicts the graphical form of key dimensions and constructs studied in this research, that is, the research model:

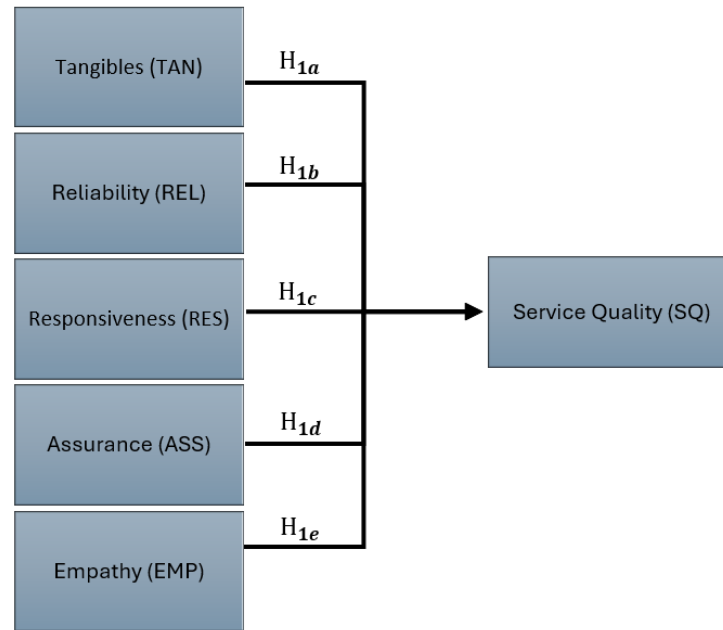


Figure 1: Conceptual framework model

As depicted in Figure 1, each construct is hypothesized to influence service quality (SQ) in the ODD services context. The hypotheses (H_{1a} , H_{1b} , H_{1c} , H_{1d} and H_{1e}) reflect the proposed correlations between each service quality dimension and overall service quality as a result of using ODD in the construction material industry. The TAN construct represents the physical aspects of service delivery, such as the quality of delivery vehicles, employee presentation, and the usability of digital platforms (Arlı et al., 2024; Parasuraman et al., 1988). Prior research suggests that well-maintained physical infrastructure and professional staff enhance customer impressions and satisfaction (Arlı et al., 2024; Ngaliiman et al., 2019). Accordingly, H_{1a} posits that there is a significant positive correlation between TAN and SQ in the context of ODD services within the construction material industry.

The REL construct refers to the consistency and accuracy of service delivery (Parasuraman et al., 1988). In the ODD context, REL is ensuring that materials are delivered on time and in the correct condition, fostering customer trust (Ngaliiman et al., 2019; Zygiaris et al., 2022). Therefore, H_{1b} hypothesizes that there is a significant positive correlation between REL and SQ. The RES construct emphasizes a company's ability to deliver services swiftly and address

customer concerns efficiently (Parasuraman et al., 1988). This aspect is particularly crucial in ODD services due to the time-sensitive nature of construction projects (Arli et al., 2024; Ngaliiman et al., 2019). Consequently, H_{1c} proposes that there is a significant positive correlation between RES and SQ.

Furthermore, the ASS construct pertains to the knowledge, competence, and courtesy of employees, as well as the security of transactions on ODD platforms (Arli et al., 2024; Parasuraman et al., 1988). Customers need to feel confident when using ODD services for high-value construction materials, and assurance fosters trust and reduces perceived risk, as highlighted by Mitropoulou and Tsoulfas (2021). Thus, H_{1d} suggests that there is a significant positive correlation between ASS and SQ.

Lastly, the EMP construct reflects the degree of personalized attention and care provided to customers (Parasuraman et al., 1988). Tailored support and understanding of unique customer needs can significantly enhance the overall service experience, as substantiated by Arli et al. (2024) and Mitropoulou and Tsoulfas (2021), who emphasize the importance of empathy in building strong customer relationships. Accordingly, H_{1e} posits that there is a significant positive correlation between EMP and SQ.

This structured approach, depicted in Figure 1, sets the premise for an empirical assessment of how these constructs collectively contribute to enhancing service experiences in the digital supply chain ecosystem of the construction material industry.

2.9 Conclusion of Literature Review

The literature reviewed above underscores the significance of service quality dimensions, viz: tangibles, reliability, responsiveness, assurance, and empathy in shaping customer satisfaction within the ODD services of the construction material industry. Each of these constructs contributes uniquely to consumer perceptions and overall service experience and the hypotheses developed as a result of reviewing the literature are restated below:

2.9.1 Hypothesis 1

The tangibles construct highlights the role of physical elements such as well-maintained facilities, professional staff, and online platform usability in enhancing customer impressions and satisfaction (Arlı et al., 2024; Ngaliman et al., 2019). Based on these insights, the study formulated the following hypothesis:

H_{1a}: There is a significant positive correlation between tangibles and service quality in the context of ODD within the construction material industry.

2.9.2 Hypothesis 2

Reliability, defined by the accuracy and dependability of service fulfilment, has been identified as a key driver of service quality and trust (Ngaliman et al., 2019; Zygiaris et al., 2022). This resulted in the following hypothesis:

H_{1b}: There is a significant positive correlation between reliability and service quality in the context of ODD within the construction material industry.

2.9.3 Hypothesis 3

The responsiveness construct emphasizes the importance of timely and effective service, particularly in the time-sensitive nature of ODD services (Arlı et al., 2024). Research by Ngaliman et al. (2019) and Arlı et al. (2024) suggests that a company's ability to meet customer demands promptly strengthens satisfaction and long-term relationships. The following hypothesis was proposed:

H_{1c}: There is a significant positive correlation between responsiveness and service quality in the context of ODD within the construction material industry.

2.9.4 Hypothesis 4

Assurance, which pertains to employee professionalism, system security, and the ability to instil confidence, plays a crucial role in customer satisfaction (Mitropoulou & Tsoufas, 2021). Given its role in ensuring trust and reliability in

online platforms and supply chain services, the following hypothesis was generated:

H_{1d}: There is a significant positive correlation between assurance and service quality in the context of ODD within the construction material industry.

2.9.5 Hypothesis 5

Finally, empathy, which reflects a company's ability to provide personalized attention and care, is recognized as a contributing factor in building strong customer relationships and enhancing service experiences (Arli et al., 2024; Mitropoulou & Tsoulfas, 2021). Based on these insights, the study proposed the following hypothesis:

H_{1e}: There is a significant positive correlation between empathy and service quality in the context of ODD within the construction material industry.

As outlined above, the literature suggests that these five service quality dimensions in some way impact customer satisfaction in ODD services within the construction material industry. The hypotheses in this study lay the foundation for the quantitative analysis in the following chapters, aiming to deepen understanding of service quality's impact on customer experiences in this sector.

CHAPTER 3. RESEARCH METHODOLOGY

This section outlines the approach adopted in this study to ensure systematic data collection, analysis, and interpretation. The research approach specifies that a qualitative strategy is used and elaborates on the rationale behind this choice.

The data collection methods section describes how information was gathered, while the population and sample section detail the target participants and sampling strategy. The research instrument section explains the tools used for data collection, and the procedure for data collection outlines the step-by-step process followed. Data analysis strategies and interpretation describe the systematic approach used for analyzing the data.

Additionally, this section addresses possible limitations and challenges, ensuring transparency regarding constraints that may affect findings. The quality assurance section discusses measures impacting on data reliability and validity, while ethical considerations cover confidentiality, informed consent, and data subject protection. Finally, the proposed schedule and timelines provide a roadmap for the execution of the research.

3.1 Research approach

As substantiated above in the conclusion section of the literature review, a quantitative research analysis approach was used in this research as it is better suited for evaluating the broad impacts of ODD services in South Africa's construction material industry to provide the necessary objectivity and scalability.

Furthermore, a positivist paradigm was chosen due to its focus on objectivity, empirical evidence, and hypothesis testing (Park et al., 2020). According to Park et al. (2020), the paradigm assumes reality can be measured and quantified, using controlled experiments or observations to analyse causal relationships between variables. This research aims to investigate and understand the impact of the latent variables defined in SERVQUAL on service quality as a result of using ODD services. This is the reason it adopted a positivist philosophy, which seeks to understand variable interactions through quantitative data analysis, this

approach also ensures that the findings are generalizable and replicable (Park et al., 2020).

3.2 Research design

This study employed a cross-sectional research design, which involves collecting data at a single point in time from a sample population (Saunders et al., 2019). According to Saunders et al. (2019), a cross-sectional study is a snapshot of data collection that focuses on understanding how variables relate to each other within a particular population at a specific moment. This design was chosen due to time constraints in data collection, making it the most practical approach for investigating and understanding the impact of latent SERVQUAL variables on the service quality within the available timeframe.

3.3 Data collection methods

A structured questionnaire was used as the primary method for data collection in this study. It was systematically divided into distinct sections, each designed to address each of the specific research constructs.

The questionnaire was designed and distributed through the Wits University Qualtrics platform. Prior to its full deployment, a pilot round was conducted with a small sample group to assess the clarity and coherence of the questions. This preliminary testing facilitated the identification and rectification of any issues related to question wording or survey flow, ensuring the effectiveness of the instrument. More details about the research instrument and the procedure followed to collect data are provided in section 3.5 and 3.6 below

3.4 Population and sample

3.4.1 *Population*

According to Saunders et al. (2019), the population consists of all cases or elements that a researcher intends to study. In this study, the population included all subjects capable of providing data to address the research questions.

For this study, the population comprised of South African consumers involved as stakeholders, in Personal, Residential, Infrastructure, Commercial, or Industrial construction projects, whether new or for maintenance within the last three years. Due to the large size of this population, the study focused on a target population, as recommended by Saunders et al. (2019), to ensure feasibility while maintaining the study's validity. Furthermore, the study specifically examined participants who purchased the types of construction materials outlined in Section 1.6 (iii), which details the material choices considered in this research. The sampling techniques and procedures are outlined in the next section.

3.4.2 *Sample and sampling method*

According to Saunders et al. (2019), a sampling frame is a crucial list or guideline set that identifies elements of the target population for research. For this study, a complete and comprehensive list of stakeholders in the specified construction projects who used ODD services was not feasible to obtain. Given the impracticality of constructing a sampling frame, the author opted to select a sampling technique in the absence of a defined frame and relied on previous research to estimate an appropriate sample size. That is, the sample size for this study was determined by referencing previous research, such as Kikwasi et al. (2023) and Addy et al. (2023), who conducted quantitative analyses with sample sizes of 100 and 205, respectively.

Additionally, Subramanya et al. (2023) noted that response rates in the construction sector tend to be lower than in other industries due to demanding work schedules. Their study, for instance, distributed surveys to 1,200 individuals, yet they received only 53 valid responses for analysis, highlighting

the challenges associated with obtaining large sample sizes in this field (Subramanya et al., 2023).

This research employed a combination of non-probability sampling methods, as defined by Saunders et al. (2019), specifically convenience sampling and snowball sampling. Initially, participants were selected based on their availability and alignment with the population criteria. Subsequently, referrals from these respondents helped expand the sample. The target was to collect 120 questionnaire responses to ensure robust results while considering time constraints.

3.5 The research instrument

As mentioned above, the primary research instrument employed in this study was a survey questionnaire. The survey began with a participant information page, followed by a consent form page that required respondents to provide their informed consent before proceeding.

The main body of the survey was structured into two sections, the first section consisted of contextual questions aimed at gathering information about the respondents' construction projects. Among these, a critical question was one which asked respondents how frequently they utilized ODD services during their projects. This question was crucial in enabling the author to identify respondents who used ODD services and those who did not.

The second section included 15 Likert-scale statements and three open-ended questions, designed to measure key research constructs of the SERVQUAL model, i.e., Tangibles, Reliability, Responsiveness, Assurance, Empathy, and overall Service Quality. The closed-ended questions, particularly those using the Likert scale, facilitated the collection of quantitative data, while open-ended questions enabled respondents to elaborate on their experiences where applicable.

To assess respondents' service quality perceptions, the study employed a 7-point Likert scale, where 1 represented "Strongly Disagree" and 7 represented

"Strongly Agree". The use of a 7-point scale is supported by research, including the study by Preston and Colman (2000), which emphasizes its optimal balance of reliability and validity and validity, making it an effective tool for capturing detailed attitudinal data.

The survey statements used to measure the SERVQUAL constructs were adapted from several studies to suit this study's specific context, as summarized in Table 2 below. These studies include Zhang and Hou (2013), who examined the application of the SERVQUAL model in evaluating service quality within supply chain management, emphasizing the role of Tangibles, Reliability, Responsiveness, Assurance, and Empathy in optimizing supply chain operations.

Additionally, Arli et al. (2024) explored the relationship between service quality and customer satisfaction, loyalty, and repurchase intention in the online food delivery industry. Their study demonstrated how SERVQUAL dimensions influence customer experiences and decision-making when using ODD platforms (Arli et al., 2024). Similarly, Setiono and Hidayat (2022) analysed the impact of the five SERVQUAL dimensions on customer satisfaction within a marine service company, PT. Pelindo Marine Service, employing a quantitative approach to assess these relationships.

Furthermore, Sugiarto and Octaviana (2021) investigated the relationship between SERVQUAL dimensions and customer satisfaction in the banking sector, specifically among BRI bank customers. Moreover, Zygiaris et al. (2022) examined post-pandemic service quality in the auto care industry in Saudi Arabia, employing the SERVQUAL framework to assess how different dimensions of service quality influenced customer satisfaction.

Lastly, Pakurár et al. (2019) extended the traditional SERVQUAL model in their study on the Jordanian banking sector by incorporating three additional dimensions, namely, financial aspect, access, and employee competencies alongside the original dimensions.

Table 2: Research constructs and items included in the questionnaire

Construct	Item	Statement	Adapted From
Tangibles	TAN1	The physical condition of materials delivered for my project met expectations.	(Arli et al., 2024; Pakurár et al., 2019; Parasuraman et al., 1988; Setiono & Hidayat, 2022; Sugiarto & Octaviana, 2021; Zhang & Hou, 2013; Zygiaris et al., 2022)
Tangibles	TAN2	The service provider's facilities and vehicles were well-maintained and contributed to a smooth delivery process during my project.	
Empathy	EMP1	The service provider demonstrated a genuine concern for ensuring that deliveries met my needs during my project.	
Empathy	EMP2	The service provider's staff was knowledgeable and capable of handling delivery-related queries efficiently throughout my project.	
Reliability	REL1	Overall, the service provider reliably delivered materials without errors or delays for my project.	
Reliability	REL2	The delivery service I used for my project often delivered materials within the promised time frame.	
Responsiveness	RES1	The delivery service provider was quick to respond to any issues or changes in delivery requirements during my project.	
Responsiveness	RES2	The service provider was flexible and accommodating to any special requests or last-minute changes during my project.	
Assurance	ASS1	I felt confident that the service provider will fulfil my delivery requirements consistently for my project.	
Assurance	ASS2	Overall, the delivery service consistently met my expectations during my project.	
Service Quality	SQ1	The delivery process was streamlined and integrated well with the operational processes of my project.	

Construct	Item	Statement	Adapted From
Service Quality	SQ2	Using this service reduced the time it took to obtain necessary construction materials for my project.	
Service Quality	SQ3	The cost of delivery services for my project was reasonable considering the quality of service provided.	
Service Quality	SQ4	The delivery service helped reduce overall material procurement costs for my project.	
Service Quality	SQ5	The delivery services for my project had additional hidden costs	

Note: Table compiled by author

The complete questionnaire administered to respondents in this study is provided in Appendix A.

3.6 Procedure for data collection

Data was gathered using an online questionnaire survey instrument, with the link to the questionnaire widely shared through social media platforms such as WhatsApp. The link was distributed both to direct contacts and within WhatsApp groups, ensuring broad dissemination. To enhance the likelihood of reaching appropriate respondents, the shared link clearly outlined the population criteria.

Ali et al. (2020) demonstrated that social media could be an effective tool for administering surveys, as it enables broad and efficient participant recruitment. Their study, conducted during the COVID-19 pandemic, successfully utilized Facebook to recruit participants for a large-scale online survey conducted over ten days using the Qualtrics platform (Ali et al., 2020). This highlighted the potential of social media platforms in rapidly reaching diverse populations for survey research. For this study, in addition to sharing the survey link on social media, respondents were encouraged to re-share the link with their connections who also met the specified population criteria.

To reach potential respondents who were not active on social media, a direct approach was also employed. These individuals were approached in-person by the author who then shared the questionnaire link with them through their preferred communication channels, ensuring accessibility. For those without access to mobile smartphones, the author's device was made available to facilitate survey completion, which took approximately ten minutes.

Similar to an approach followed by Addy et al. (2023), who contacted construction professionals meeting specific criteria and then requested referrals for others within that same pool, this study also employed a referral method to identify additional qualifying participants, further enhancing the reach and diversity of the respondent pool.

3.7 Data analysis strategies and interpretation

Following data collection, the analysis was conducted using IBM Statistical Package for the Social Sciences (SPSS) to perform descriptive statistics and hypothesis testing. The initial phase of the analysis involved data preparation, which included cleaning and organizing the dataset to ensure accuracy and consistency. In particular, categorical and Likert scale responses were appropriately coded using IBM SPSS and Microsoft Excel to facilitate statistical analysis (Elliott et al., 2006; Pallant, 2020). This step was crucial in ensuring that the data was structured correctly for subsequent analyses.

To provide a comprehensive overview of the dataset, demographic data was visualized using various charts as presented in the results section, offering a clear representation of response distributions (Pallant, 2020). While Microsoft Power BI version 2.139.2054.0 was not specifically designed for research data analysis, it was utilized for basic text analysis, including word cloud generation, to identify common themes emerging from responses of open-ended questions. These visualizations aim to enhance the interpretability of the data, supporting a more in-depth understanding of participant demographics and trends.

For hypothesis testing, IBM SPSS Analysis of Moment Structures (AMOS) was employed to conduct detailed statistical analyses. That is, Structural Equation

Modelling (SEM) was employed to conduct complex data analysis. SEM is a robust multivariate statistical technique designed to examine structural relationships between observed variables and latent constructs (Hair & Sarstedt, 2019). SEM facilitates the estimation and validation of complex causal relationships within a theoretically specified model (Bagozzi & Youjae, 1988; Hair & Sarstedt, 2019).

The findings from the analysis were then synthesized to determine whether the hypotheses should be accepted or rejected. This analytical approach ensured a rigorous examination of the relationships between key variables. The combination of descriptive, quantitative, and inferential statistical methods aims to provide a robust evaluation of the constructs investigated in this study.

3.8 Possible limitations and challenges of the study

One of the primary limitations of this study could be the presence of sampling bias. The initial target sample size of 120 for consumers who used ODD was not achieved, which may result in a sample of construction material consumers that was not fully representative of the broader population. This limitation could further be compounded by the use of convenience sampling, which restricted the generalizability of the findings across different regions, project types, and consumer demographics within South Africa (Etikan, 2016).

Additionally, response bias emerged as a potential weakness, particularly in relation to the Likert scale questions. Respondents may have provided socially desirable answers rather than accurate reflections of their experiences, thereby influencing the reliability of the data collected (Podsakoff et al., 2003).

3.9 Quality Assurance

3.9.1 *External validity*

External validity concerns the extent to which a study's findings can be generalized to other settings, populations, or times (Calder et al., 1982). In this

research, external validity may be limited due to sampling bias and reliance on self-reported data, which might not represent all construction material consumers in South Africa (Shadish et al., 2002). The use of a cross-sectional design could further restrict generalizability over time (Wang & Cheng, 2020).

To improve generalizability, researchers could employ random sampling, increase sample size, conduct longitudinal studies, and include diverse contexts (Etikan, 2016). However, if the sample is biased or context-specific, the findings may not be widely applicable, impacting the study's ability to inform broader decisions (Podsakoff et al., 2003; Shadish et al., 2002).

3.9.2 Internal validity

Internal validity ensures that a study's effects are due to the variables being studied, without interference from confounding factors (Shadish et al., 2002). In this research, it may be compromised by uncontrolled variables, participant biases, or improper sampling (Etikan, 2016; Podsakoff et al., 2003). The study's generalizability is limited if the sample isn't representative, which could restrict the application of its findings to broader contexts (Shadish et al., 2002). Acknowledging these limitations and conducting additional studies in the near future will help validate the results.

3.9.3 Reliability

Reliability refers to the consistency of results in research (Field, 2013). In this research, reliability might be compromised due to the data collection methods, such as Likert scale questions, not being applied consistently across participants, leading to variability in responses (Field, 2013). To enhance reliability, the Qualtrics online survey used in this research standardized data collection and ensured clear instructions.

3.10 Ethical considerations

To ensure ethical research standards, participants were provided with a Participant Information Sheet and an Informed Consent Form, attached in

APPENDIX B and C respectively. These documents comprehensively outlined the study's purpose, procedures, and the rights of participants, including assurances of confidentiality and the freedom to withdraw from the study at any stage without consequence. Prior to their participation, individuals were required to review and sign the consent form, ensuring that they had a clear understanding of their involvement and voluntarily agreed to take part in the research.

Furthermore, an Ethics Application Form was completed and submitted for institutional approval before the commencement of the study. All research activities were conducted in strict compliance with the guidelines stipulated in the approved ethics application, the ethics clearance certificate is attached in APPENDIX D. This adherence served to safeguard the rights, dignity, and well-being of participants throughout the research process, reinforcing the commitment to ethical integrity and responsible research conduct.

3.11 Proposed schedule and timelines

The research is scheduled for completion and submission by February 2025, the planning and preparation phase took place in August and September 2024. During this period, the research design, questionnaire, methodology, and ethical considerations were prepared and submitted for review. This phase also included securing all necessary approvals before proceeding to full-scale data collection.

The data collection phase was planned for October 2024 but began in late November 2024 through to December 2024, this was followed by data cleaning and organization in January 2025. Subsequently, data analysis was scheduled to be conducted in December but due to delays occurring in previous phases, it began in January 2025. In beginning of February 2025, the focus is on interpreting the results and drafting the final sections of the report. The final report is intended to be submitted to the supervisor for review towards the end of early February 2025, leading up to the final submission end of February 2025.

The data collection phase was originally planned for October 2024 but began in late November 2024 and continued through December 2024. This was followed by data cleaning and organization in January 2025. Data analysis was scheduled

to be conducted in December 2024, however, due to delays in the previous phases, it commenced in January 2025. At the beginning of February 2025, the focus was on interpreting the results and drafting the final sections of the report, with the intention of submitting it to the supervisor for review in early February 2025, leading up to the final submission at the end of February 2025.

CHAPTER 4. PRESENTATION OF RESULTS

4.1 Introduction

This chapter presents the results of the study, beginning with a descriptive analysis of the sample data collected. The descriptive analysis provides an overview of the dataset, ensuring a clear understanding of the characteristics of the respondents under investigation.

Following this, the results related to measures of central tendency and dispersion will be presented for each construct underpinning the research hypotheses. Specifically, key descriptive statistics including the mean, standard deviation, skewness, and kurtosis will be provided to summarize the distribution and variability of the data.

The mean represents the average value of a dataset and serves as a measure that provides an overall summary of a variable's typical value (Field, 2018). In this research, the mean indicates the average score for a Likert scale statement. The standard deviation (SD) quantifies the extent to which data points deviate from the mean (Hair et al., 2019). In this study, the SD tells us how spread out the Likert scale responses are.

Skewness and kurtosis assess the shape of the data distribution (Tabachnick & Fidell, 2018; West et al., 1995). Skewness measures the asymmetry of the data distribution around the mean (Tabachnick & Fidell, 2018). A skewness value close to zero suggests a symmetric distribution, whereas positive and negative skewness values indicate right and left skewed distributions, respectively (Tabachnick & Fidell, 2018). In this study, skewness helps determine whether responses are imbalanced toward one side of the scale.

Kurtosis, on the other hand, measures the "tailedness" of the data distribution that is, how frequently extreme values (outliers) occur (West et al., 1995). According to West et al. (1995), a kurtosis value close to zero indicates a normal

distribution, while positive kurtosis signifies a distribution with heavy tails (more extreme values), and negative kurtosis suggests a distribution with lighter tails (fewer extreme values). In this study, kurtosis helps assess whether responses are concentrated in a narrow range or spread widely across the scale.

Following the above section, a reliability analysis will be presented to evaluate the consistency of the measurement scales used in this study. This analysis was conducted using Cronbach's Alpha, a statistic that measures the internal consistency of a set of items intended to measure a single construct (Nunnally, 1994). A Cronbach's Alpha coefficient of 0.7 or higher is generally considered acceptable, indicating good internal consistency, while values below 0.6 suggest poor reliability (Nunnally, 1994). In this study, Cronbach's Alpha was used to ensure that the Likert scale statements reliably measure the constructs they were designed to assess.

Finally, the chapter will conclude with the results of a SEM, which will be used to test the relationships between the constructs and, by extension, the hypotheses formulated in this study. SEM evaluates relationships between observed and latent variables, providing a comprehensive examination of the proposed theoretical framework (Byrne & St, 2022). That is, it helps determine how well the constructs in the research model relate to one another and whether this study's proposed hypotheses hold true (Byrne & St, 2022).

The next section presents the descriptive analysis of the sample data.

4.2 Overview of descriptive statistics for sample data

This section provides a summary of the key descriptive statistics derived from the survey data, offering context regarding the respondents' construction projects. The survey was designed to capture responses from a broad range of construction material consumers, not exclusively those who had utilized ODD services. That is, it included all individuals who had been involved in a construction project within the past three years, irrespective of whether they used ODD or a traditional delivery service.

Given this broad sample, the dataset contains responses from both users and non-users of ODD services. To effectively distinguish between these two groups, a survey question was included, asking participants whether they had used ODD services during their construction projects and how often. This distinction is fundamental to the study, as it allows for a comparative descriptive analysis between those who have experienced ODD services and those who have not.

Accordingly, this section first presents an overall summary of all respondents' data, then proceeds to examine service quality perceptions among those who did not use ODD. Finally, it presents the key results related to respondents who have utilized ODD services. A comprehensive breakdown of the descriptive analysis, generated using MS Power BI for each of these groups, is available in APPENDICES E, F, and G respectively.

4.2.1 All respondents

As seen in APPENDIX E, there were a total of 140 respondents, with 108 (77.14%) having used ODD services and 32 (22.86%) not using them. Geographically, the majority of respondents were from Gauteng (61%), followed by Limpopo (25%), Mpumalanga (10%), KwaZulu-Natal (2%), and North-West (2%). The results show that 80% of respondents were engaged in residential projects, while 18% were involved in commercial developments, and only 1% worked on infrastructure and industrial projects.

In terms of project age, 32.86% were completed within the last six months, while 23.57% were between six months and one year old, and the remaining projects ranged from one to three years old. Regarding the roles of respondents, 58.57% were property owners, 22.86% were builders, and 14% were project managers, with 3.57% belonging to other roles. The materials most commonly purchased by all consumers included concrete, cement, aggregates, bricks, finishing materials, plastics, glass, and masonry materials.

The results further show that 45.71% of consumers agreed that their delivery process was well-integrated with their project workflows, while 37.15% disagreed. Additionally, 36.43% of respondents agreed that the delivery services they used

reduced delivery time, while 25.71% expressed dissatisfaction. Regarding cost perceptions, 36.42% found the pricing reasonable, while 26.57% disagreed. Similarly, 34.28% agreed that the delivery service they used reduced material procurement costs. A notable outcome was that 48.57% of respondents disagreed that there were hidden costs in the service they used, regardless of whether they opted for traditional delivery or ODD services.

4.2.2 Respondents who did not use On-Demand Delivery (ODD)

The findings presented in Appendix F provide valuable insights into the experiences of 32 consumers who did not utilize ODD services during their construction projects. Representing 22.86% of the total respondents, this group offers a useful baseline for comparison against users of ODD services, allowing the study to assess the influence of ODD on service quality perceptions. These insights are critical in contributing to the answer to the overarching research question, which examines whether there is a statistically significant relationship between ODD services and service quality in the South African construction material industry.

The majority of these consumers (63%) were from Gauteng, with smaller representations from Limpopo (22%), Mpumalanga (6%), North-West (6%), and KwaZulu-Natal (3%). Nearly all participants (97%) were involved in residential construction projects, such as home building and renovations, while only 3% worked on commercial projects, including office buildings and retail spaces. In terms of project timelines, 40.63% of respondents completed their projects recently, within the last six months, while 28.13% completed their projects between six months and one year ago. The remaining participants completed their projects between one and three years ago.

Regarding roles in the project, property owners made up the largest group (59.38%), followed by builders (37.5%) and project managers (3.13%). These consumers purchased a wide variety of construction materials, including tiles, paint, aggregates, sand, masonry, concrete, gravel, cement, and bricks. Figure 2 below presents a word cloud visualization of feedback from non-ODD users, highlighting the dominant issues reported by these respondents. Terms such as

"late", "delays", "broken", "costly", "disturbed", and "incorrect" were frequently mentioned, suggesting widespread dissatisfaction with delivery timelines, material condition, and cost-related transparency.



Figure 2: Word Cloud of respondents' views on the impact of traditional delivery services

As seen in Figure 2, some respondents mentioned that traditional delivery services hindered their progress, while a smaller portion found them reasonable.

The responses to the survey items used to measure the SQ construct reflect consumers' experiences with traditional delivery services, as presented in Figure 3. For SQ1, which asked whether the traditional delivery process was well integrated and streamlined within their project operations, only 18.76% of respondents agreed, while 15.63% remained neutral. A significant portion (65.64%) expressed dissatisfaction, either somewhat disagreeing, disagreeing, or strongly disagreeing. These insights are particularly relevant to sub question 1.2 and provide strong support for Hypothesis H_{1b} , which posits a significant positive correlation between reliability and service quality within the ODD context. ODD services, which offer digital tracking and precise scheduling, appear well-positioned to address these frustrations and restore reliability.

Regarding SQ2, which assessed the efficiency of traditional delivery services in reducing the time needed to obtain materials, 28.13% of respondents responded positively, 25% remained neutral, while a notable 46.88% disagreed to varying

degrees. This reinforces concerns around responsiveness, supporting sub question 1.3 and supporting Hypothesis H_{1c} . Traditional delivery systems evidently lack the agility to meet project specific time demands, something ODD services, with real-time updates and responsive rerouting, are designed to overcome.

Regarding the Tangibles dimension, the frequent mention of “broken” and “incorrect” deliveries in Figure 2, combined with low satisfaction levels in SQ1 and SQ2 as shown in Figure 3, suggests that traditional services often fail to deliver physical materials in acceptable condition and with the required efficiency. This observation is critical for supporting to address sub question 1.1 and also supports Hypothesis H_{1a} . By enhancing logistics integration and implementing robust quality assurance measures, ODD services have the potential to improve the material handling experience for customers.

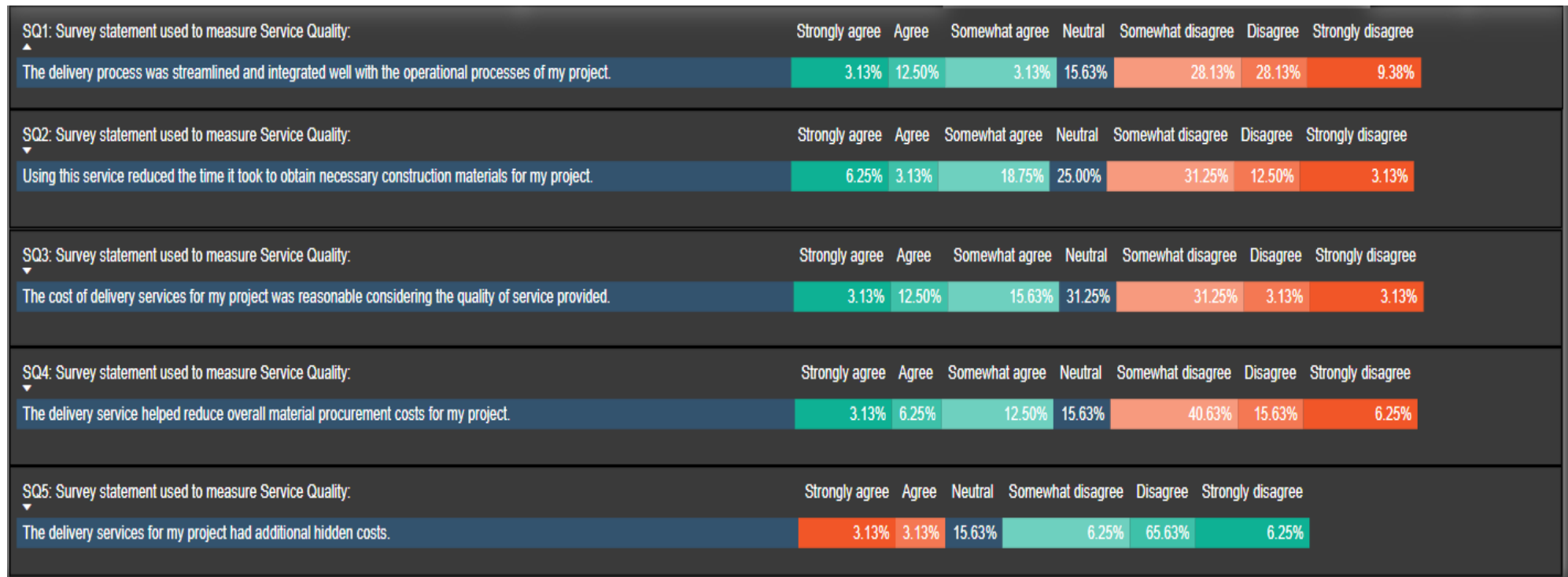


Figure 3: Frequency matrix of five items used to measure consumers' Service Quality (SQ) as a result of using traditional delivery services

As seen in Figure 3 above, when evaluating whether delivery costs were reasonable, only 31.26% of respondents agreed, while 31.25% remained neutral and 37.51% somewhat or strongly disagreed. Similarly, when asked whether traditional delivery services helped reduce overall material procurement costs, 21.88% agreed, 15.63% remained neutral, and 62.51% disagreed. These responses relate to sub question 1.4 and validate Hypothesis H_{1d} . The uncertainty and lack of perceived value in traditional services highlight the need for more predictable and transparent pricing mechanisms, an area where ODD services can build customer trust through standardized, upfront cost structures.

Regarding the item on hidden costs (SQ5), 6.26% of respondents agreed that there were unexpected charges, while the majority (78.13%) disagreed, and 15.63% remained neutral. Although this might suggest a degree of transparency, it is important to interpret this in light of other data points, that is, while hidden costs may not have been widespread, the lack of flexibility and personalization in traditional services still points to poor service quality. This relates to sub question 1.5 and provides a nuanced basis for Hypothesis H_{1e} . ODD platforms, which allow for customizable delivery preferences and customer-centric service design, could enhance empathy by aligning delivery options with client-specific needs.

4.2.3 Respondents who used On-Demand Delivery (ODD)

The report in APPENDIX G presents the results of 108 consumers who used ODD during their construction projects, representing 77.14% of the total respondents in this study.

Respondents also shared their perspectives on the benefits and challenges of using ODD, with keywords such as "saved," "quick," "care," and "improved" emerging prominently as depicted in the word cloud on Figure 4. Many praised ODD services for its efficiency, reliability, and better handling of materials, while some noted challenges such as high costs and occasional late deliveries.

A majority of these consumers (60%) were from Gauteng, with significant participation from Limpopo (26%), while Mpumalanga (11%), KwaZulu-Natal (2%), and North-West (1%) had smaller representation. Most projects (75%) were

residential, while commercial projects accounted for 22%, and infrastructure/industrial projects made up the remaining 3%.

The timeline of projects varied, with 25.93% completed in the last six months, 23.25% between six months and a year ago, 20.37% between one and two years ago, and the remaining 30.56% between two and three years ago. More than half of the respondents (58.33%) were property owners, while builders and project managers each accounted for 18.52% and 4.63% were categorized as “other”.

The common types of construction materials purchased through ODD included cement, concrete, bricks, aggregates, tiles, finishing products, steel, sand, lumber, and plastic. Respondents also shared their perspectives on the benefits and challenges of using ODD, with keywords such as "saved," "quick," "care," and "improved" emerging prominently, as depicted in the word cloud in Figure 4. Many praised ODD services for their efficiency, reliability, and improved material handling, while some noted challenges such as high costs and occasional late deliveries.



Figure 4: Word Cloud of respondents' views on the impact of ODD services

The survey also explored how users perceived the service quality of ODD, with the results presented in Figure 5. When asked about the efficiency of the delivery process, 33.33% of respondents agreed that it was streamlined and well-integrated with their project processes, while 20.37% somewhat agreed. However, 14.81% somewhat disagreed, 13.89% disagreed, and 17.59% remained neutral. Regarding value for time, 71.3% of respondents believed ODD reduced the time required to obtain materials, while a smaller portion (19.44%) expressed dissatisfaction, and 9.26% remained neutral.

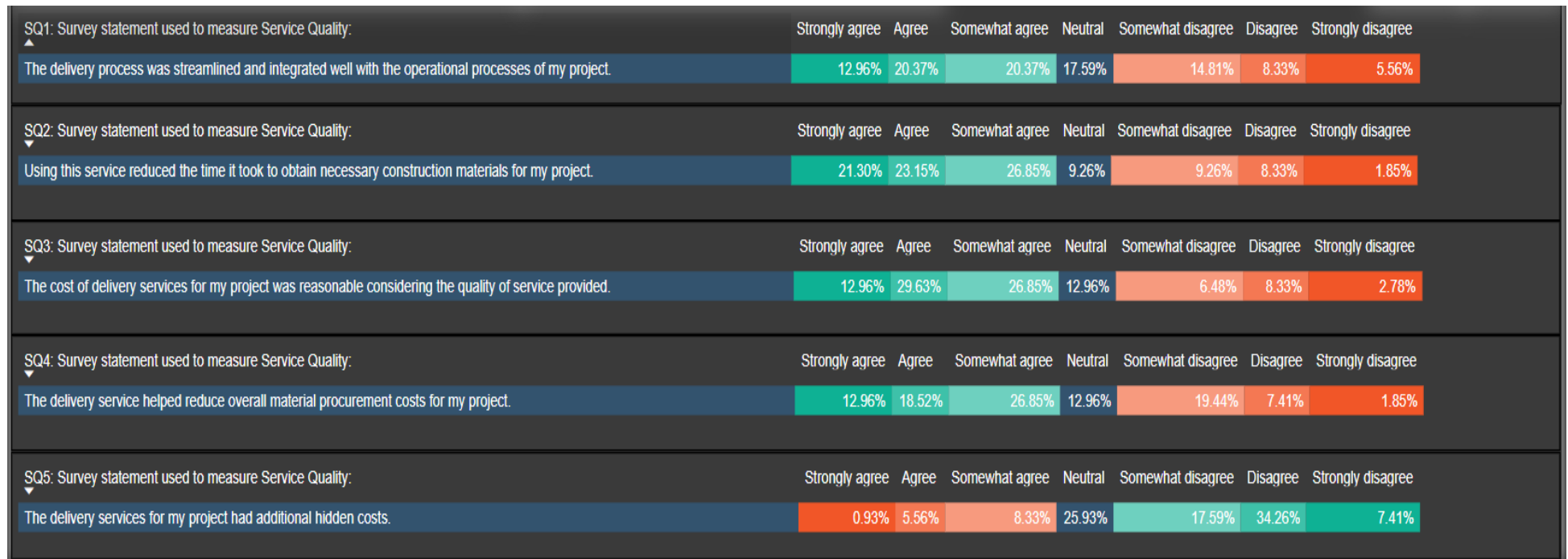


Figure 5: Frequency matrix of five items used to measure consumers' Service Quality (SQ) as a result of using ODD services

The cost of using ODD services was another critical factor, with 69.44% of respondents finding it reasonable, while 17.59% disagreed and 12.96% remained neutral. Similarly, 58.33% of respondents believed ODD helped reduce overall material procurement costs, while 12.96% remained neutral and 28.7% disagreeing. Regarding hidden costs, 59.26% of respondents disagreed that there were unexpected fees, while 8.33% somewhat agreed, 5.56% agreed, and 0.93% strongly agreed that ODD had hidden costs. The remaining 25.93% were neutral.

The following sections present the descriptive statistics of the 108 respondents who used ODD, they represent 77.14% of this study's total responses. Detailed results for these descriptive statistics are also provided in APPENDIX H.

4.3 Results pertaining to Hypothesis 1

This section presents the descriptive statistics for the TAN construct which underpins hypothesis 1. The TAN construct assesses the physical condition of delivered materials and the maintenance of the service provider's facilities and vehicles.

As seen in Table 3, the overall TAN measure, representing the combined responses, has a mean score of 5.5972 with a SD of 1.17302. This relatively high mean suggests that respondents generally had a positive perception of TAN aspects of service quality in the construction material industry, with slight variation. The skewness value of -0.871 indicates a negatively skewed distribution, meaning that the majority of responses leaned toward higher satisfaction levels. This implies that most respondents were satisfied with the tangible aspects, although a smaller subset of respondents had lower satisfaction ratings.

Meanwhile, the kurtosis value of 0.500 suggests a distribution that is slightly flatter than normal. This indicates that the data shows a reasonable level of variability in respondents' perceptions without notable extreme responses, meaning that while most respondents reported positive experiences, the variation indicates differing degrees of satisfaction.

Table 3: Descriptive statistics for Tangibles construct

Item	Statement	N	Mean	SD	Skewness	Kurtosis
TAN1	The physical condition of materials delivered for my project met expectations.	108	5.85	1.296	-1.610	2.850
TAN2	The service provider's facilities and vehicles were well-maintained and contributed to a smooth delivery process during my project.	108	5.34	1.607	-0.990	0.204
Overall Tangibles		108	5.5972	1.17302	-0.871	0.500

Note: Table compiled by author

Examining the individual items further, TAN1, which assesses the physical condition of delivered materials, has the highest mean score of 5.85, a SD value of 1.296 and a relatively high negative skewness of -1.610, indicating a strong agreement among respondents that materials met their expectations. The kurtosis value of 2.850 further implies a peaked distribution, indicating that most responses clustered tightly around the high satisfaction mark, suggesting consistency in perceived material quality.

In contrast, TAN2, which evaluates the maintenance of service provider facilities and vehicles, has a slightly lower mean of 5.34 with a SD of 1.607, accompanied by skewness of -0.990, showing that while most respondents perceived the ODD's infrastructure positively, their views were slightly more varied compared to material condition. Furthermore, the kurtosis value is substantially lower than that of TAN1 at 0.204, reflecting a distribution closer to normal and indicative of a broader range of perceptions. This suggests some variability in experiences regarding the conditions of facilities and vehicles.

The frequency matrix depicted in Figure 6 provides further insights into how respondents rated the TAN aspects of service quality.

TAN1: Survey statement used to measure Tangibles:	Strongly agree	Agree	Somewhat agree	Neutral	Somewhat disagree	Disagree	Strongly disagree
The physical condition of materials delivered for my project met expectations.	36.11%	35.19%	18.52%	3.70%	1.85%	3.70%	0.93%
TAN2: Survey statement used to measure Tangibles:	Strongly agree	Agree	Somewhat agree	Neutral	Somewhat disagree	Disagree	Strongly disagree
The service provider's facilities and vehicles were well-maintained and contributed to a smooth delivery process during my project.	26.85%	31.48%	16.67%	9.26%	8.33%	4.63%	2.78%

Figure 6: Frequency matrix of two items used to measure Tangibles (TAN)

A significant majority, 71.3%, of respondents either strongly agreed (36.11%) or agreed (35.19%) that the physical condition of materials met expectations. On the other hand, 58.3% either strongly agreed (26.85%) or agreed (31.48%) that the provider's facilities and vehicles were well-maintained, with a higher proportion of neutral and disagreement responses.

Overall, the results indicate a strong positive perception of the TAN aspects of SQ in the construction material industry, providing some evidence that the hypothesis H_{1a} , which proposes that TAN have a significant positive correlation with SQ, might hold true. To establish a more definitive link between TAN and SQ, further statistical analysis will be explored in the following sections, with chapter 5 providing a detailed discussion of these results.

4.4 Results pertaining to Hypothesis 2

As part of assessing the role of REL in SQ within the construction material industry, descriptive statistics were computed for the REL construct. Table 4 below presents the results based on two key survey items: REL1, which examines whether ODD services delivered materials reliably without errors or delays, and REL2, which assesses whether deliveries were made within the promised time frame. The overall REL score was calculated to provide a broader perspective on how reliability is perceived in the context of ODD for construction materials.

The results indicate that the overall REL mean score is 5.5185, suggesting that respondents generally agreed that ODD services delivered materials reliably. The SD (1.23977) reflects moderate variability in responses, indicating that while most

respondents perceived REL positively, there were some differences in experiences. The skewness value (-0.976) suggests that responses were slightly skewed toward agreement, this reinforces the interpretation that most respondents have positively perceived service reliability, with fewer respondents experiencing dissatisfaction. This concentration of higher scores is suggesting strong customer confidence in the providers' reliability and potential loyalty to the service.

Table 4: Descriptive statistics for Reliability construct

Item	Statement	N	Mean	SD	Skewness	Kurtosis
REL1	Overall, the service provider reliably delivered materials without errors or delays for my project.	108	5.51	1.242	-0.842	0.198
REL2	The delivery service I used for my project often delivered materials within the promised time frame.	108	5.53	1.513	-0.904	-0.167
Overall Reliability		108	5.5185	1.23977	-0.976	0.305

Note: Table compiled by author

Additionally, the kurtosis value (0.305) indicates a near-normal distribution of responses, with a slightly peaked shape. This slight positive kurtosis suggests that while there is strong consensus about reliability, some minor differing experiences still exist that service providers should investigate to further strengthen overall reliability.

On a more granular level, REL1 (mean = 5.51, SD = 1.242, skewness = -0.842, kurtosis = 0.198) specifically evaluates the general reliability and absence of errors or delays in delivery. The relatively high mean underscores consistent satisfaction, while the negative skewness suggests a strong agreement bias. The low positive kurtosis reinforces the idea of a tightly clustered agreement without extreme outliers, indicating stable reliability experiences across most customers.

Similarly, REL2 (mean = 5.53, SD = 1.513, skewness = -0.904, kurtosis = -0.167) assesses reliability specifically concerning the timeliness of deliveries. The slightly higher mean compared to REL1 indicates respondents particularly valued timely service, though the higher SD points to greater variability. The negative kurtosis for REL2 suggests a flatter distribution, meaning customers had slightly more varied experiences with timing. This indicates potential inconsistencies in punctuality that ODD providers might have to address to enhance overall customer satisfaction further.

Given that REL is a fundamental aspect of SQ, these statistics provide some empirical support for the hypothesis H_{1b} that there is a significant positive correlation between TAN and SQ in ODD for construction materials. Further insights into REL perceptions can be derived from the frequency distribution of responses, illustrated in Figure 7.

REL1: Survey statement used to measure Reliability:	Strongly agree	Agree	Somewhat agree	Neutral	Somewhat disagree	Disagree
Overall, the service provider reliably delivered materials without errors or delays for my project.	16.43%	32.86%	26.43%	10.00%	12.86%	1.43%
REL2: Survey statement used to measure Reliability:	Strongly agree	Agree	Somewhat agree	Neutral	Somewhat disagree	Disagree
The delivery service I used for my project often delivered materials within the promised time frame.	27.86%	23.57%	26.43%	6.43%	9.29%	6.43%

Figure 7: Frequency matrix of two items used to measure Reliability (REL)

For REL1, a considerable portion of respondents either agreed (32.86%) or somewhat agreed (26.43%) that ODD services reliably delivered materials without errors or delays. However, 12.86% somewhat disagreed and 1.43% disagreed. REL2, which focused on timely delivery, showed an even stronger positive perception, with 27.86% of respondents strongly agreeing and 23.57% agreeing that deliveries were made within the promised timeframe. However, 9.29% somewhat disagreed and 6.43% disagreed.

Overall, the combination of descriptive statistics and frequency matrix provides supporting evidence that REL plays a crucial role in shaping SQ perceptions within the construction material industry, a detailed discussion of these results is provided in chapter 5.

4.5 Results pertaining to Hypothesis 3

Table 5 below provides the descriptive statistics for the RES construct, which was measured through RES1 and RES2 survey items. These items assess the extent to which ODD service providers respond quickly to issues or changes in delivery requirements (RES1) and their flexibility in accommodating special requests (RES2).

The overall mean score for RES is 4.8981, with a SD of 1.28026. That is, on average, respondents perceive ODD service providers as relatively responsive. The SD suggests a moderate spread of responses around the mean, reflecting that although many respondents view responsiveness positively, there is some diversity in their experiences. The skewness value of -0.878 indicates a slight left skew, suggesting that more respondents leaned toward higher agreement with the RES statements, this suggests a general tendency among participants to view ODD providers favourably in terms of responsiveness, with fewer individuals expressing dissatisfaction. The kurtosis value of 0.328 reflects a distribution that is fairly normal but slightly flatter than a normal curve, indicating that responses are somewhat spread out without pronounced peaks or outliers. This reflects a balanced range of satisfaction levels without extreme deviations.

Table 5: Descriptive statistics for Responsiveness construct

Item	Statement	N	Mean	SD	Skewness	Kurtosis
RES1	The delivery service provider was quick to respond to any issues or changes in delivery requirements during my project.	108	5.12	1.464	-0.886	0.018
RES2	The service provider was flexible and accommodating to any special requests or last-minute changes during my project.	108	4.68	1.622	-0.489	-0.436
Overall Responsiveness		108	4.8981	1.28026	-0.878	0.328

Note: Table compiled by author

Analysing individual survey items, RES1 (quick response to changes) has the highest mean score (5.12) and the lowest SD (1.464), indicating a relatively strong and consistent agreement among respondents that ODD services respond quickly to issues and changes. The negative skewness of -0.886 supports this interpretation, showing that most respondents rated this item positively. Meanwhile, the near-zero kurtosis value of 0.018 suggests a distribution close to normal, indicating that perceptions are not heavily clustered or extreme.

In contrast, RES2 (flexibility to special requests) has a lower mean (4.68) and a higher SD (1.622), implying that while many respondents perceived ODD services as flexible, there was greater variation in these responses. The skewness of -0.489 still indicates a lean toward positive perceptions, though it is less pronounced than that of RES1. The kurtosis value of -0.436 suggests a slightly flatter distribution, implying a moderate spread in responses with less clustering around the mean.

Figure 8 presents the frequency distribution of responses across different agreement levels for both RES1 and RES2.

RES1: Survey statement used to measure Responsiveness:	Strongly agree	Agree	Somewhat agree	Neutral	Somewhat disagree	Disagree	Strongly disagree
The delivery service provider was quick to respond to any issues or changes in delivery requirements during my project.	12.96%	37.96%	23.15%	9.26%	8.33%	7.41%	0.93%
RES2: Survey statement used to measure Responsiveness:	Strongly agree	Agree	Somewhat agree	Neutral	Somewhat disagree	Disagree	Strongly disagree
The service provider was flexible and accommodating to any special requests or last-minute changes during my project.	12.96%	21.30%	25.00%	17.59%	12.04%	6.48%	4.63%

Figure 8: Frequency matrix of two items used to measure Responsiveness (RES)

The results show that for RES1, a majority of respondents (50.92%) either agreed or strongly agreed that ODD services were quick to respond to issues or changes in delivery requirements. However, a notable minority (16.67%) disagreed to some extent, indicating that some customers experienced delays or inadequate responsiveness. Similarly, for RES2, while 34.26% of respondents agreed or strongly agreed that ODD services were flexible in accommodating special requests, a higher percentage (23.15%) disagreed.

These results provide partial support for H_{1c} , which posits a significant positive correlation between REL and SQ in the context of ODD within the construction material industry. The higher overall mean for REL suggests a generally positive perception, which could imply a link to SQ, these results will be explored further in chapter 5.

4.6 Results pertaining to Hypothesis 4

To assess whether there is a significant relationship between ASS and SQ in the context of ODD services, the study measured assurance using two key survey items, namely, respondents' confidence in ODD service and the ability of the ODD service to consistently meet respondents' expectations. The results presented below provide insights into how respondents perceived these aspects of service delivery.

Table 6 presents the descriptive statistics for the assurance construct. The mean score of 5.6574 suggest that respondents generally agreed that ODD service providers consistently met their expectations and instilled a sense of confidence in their delivery processes. The SD of 1.29998 indicates a moderate degree of variability in responses, though the responses were relatively concentrated around the mean. The skewness value of -1.446 reflects a pronounced negative skew which suggest that a substantial number of participants provided ratings reflecting widespread favourable assurance perceptions.

Furthermore, the kurtosis value of 2.306 indicates a more peaked distribution than normal, suggesting that responses were tightly clustered around the mean, with fewer outliers. This points to a high level of consensus among respondents in relation to the assurance offered by the ODD services.

The mean scores for the two items, 5.73 (ASS1) and 5.58 (ASS2), indicate that most respondents agreed that their expectations were met.

Table 6: Descriptive statistics for Assurance construct

Item	Statement	N	Mean	SD	Skewness	Kurtosis
ASS1	I felt confident that the service provider will fulfil my delivery requirements consistently for my project.	108	5.73	1.392	-1.371	1.585
ASS2	Overall, the delivery service consistently met my expectations during my project.	108	5.58	1.415	-1.161	1.369
Overall Assurance		108	5.6574	1.29998	-1.446	2.306

NOTE: Table compiled by author

Additionally, the SD values (1.392 for ASS1 and 1.415 for ASS2) indicate a moderate level of variability in responses, which is further supported by the overall SD value of 1.29998. The overall skewness value of -1.446, along with the skewness values for both items (-1.371 for ASS1 and -1.161 for ASS2), are negative, indicating that responses are skewed toward the higher end of the Likert scale. This suggests that more participants rated the assurance aspect favourably.

Similarly, the kurtosis values (1.585 for ASS1 and 1.369 for ASS2), supported by the overall kurtosis value of 2.306, suggest a slightly peaked distribution, indicating a concentration of responses around the mean. Figure 9 below further illustrates the distribution of responses in a frequency matrix. The data reveal that 26.43% of respondents strongly agreed and 30.71% agreed that they feel confident about using the ODD service (ASS1), with only 11.43% expressing some form of disagreement.

ASS1: Survey statement used to measure Assurance:	Strongly agree	Agree	Somewhat agree	Neutral	Somewhat disagree	Disagree	Strongly disagree
I felt confident that the service provider will fulfil my delivery requirements consistently for my project.	26.43%	30.71%	15.71%	15.71%	4.29%	5.71%	1.43%
ASS2: Survey statement used to measure Assurance:	Strongly agree	Agree	Somewhat agree	Neutral	Somewhat disagree	Disagree	Strongly disagree
Overall, the delivery service consistently met my expectations during my project.	26.43%	22.14%	24.29%	15.71%	2.86%	5.71%	2.86%

Figure 9: Frequency matrix of two items used to measure Assurance (ASS)

These results provide some empirical support for the hypothesis that ASS construct play some role in determining SQ in ODD delivery of construction materials.

A similar pattern is observed for ASS2, which examines the ability of the ODD service to consistently meet consumers' expectations. Here, 26.43% of respondents strongly agreed, 22.14% agreed, and 24.29% somewhat agreed while a smaller portion of participants expressed neutral or negative sentiments.

These results suggest some empirical support for the hypothesis that the ASS construct plays a role in influencing SQ in the ODD delivery of construction materials, chapter 5 will unpack and discuss these results further.

4.7 Results pertaining to Hypothesis 5

To assess whether EMP plays a crucial role in SQ in the context of ODD services, the study measured empathy using EMP 1 and EMP2 survey items. Table 7 presents the descriptive statistics for the EMP construct, where the overall EMP reported a mean of 5.1157, suggesting a generally positive perception of empathy across the sample. The SD (1.27632) reflects moderate variability in responses, pointing to differing levels of user experience but an overall consistent trend of agreement. The skewness value of -0.731 for indicates a moderately negatively skewed distribution, which implies that a larger proportion of respondents rated the empathy items more favourably. This shows that most users perceived empathetic behaviour from ODD service providers.

The kurtosis value of -0.163 suggests a slightly flatter than a normal distribution, which indicates that responses were moderately spread out with fewer extreme scores. The slight negative kurtosis supports the interpretation that while high scores dominate, there is still some meaningful variation in how respondents perceived empathy. This variation could reflect differences in individual interactions or expectations, which is important to consider when aiming to improve service delivery consistency.

Table 7: Descriptive statistics for Empathy construct

Item	Statement	N	Mean	SD	Skewness	Kurtosis
EMP1	The service provider demonstrated a genuine concern for ensuring that deliveries met my needs during my project.	108	5.18	1.490	-1.033	0.796
EMP2	The service provider's staff was knowledgeable and capable of handling delivery-related queries efficiently throughout my project.	108	5.06	1.634	-0.824	-0.051
Overall Empathy		108	5.1157	1.27632	-0.731	-0.163

NOTE: Table compiled by author

Examining individual items further reinforces abovementioned patterns. EMP1, which captures whether the service provider demonstrated genuine concern for customer needs, shows a mean of 5.18 and a skewness of -1.033. This stronger negative skew compared to EMP suggests that a significant majority of respondents rated this item very highly. The distribution leans heavily toward agreement, implying that customers felt especially reassured and cared for during their interactions. The kurtosis of 0.796 for EMP1 suggest that responses were more tightly clustered around the mean with fewer extreme low scores. This high concentration of positive responses may reflect strong customer alignment on this dimension of empathy, likely due to consistent service experiences.

EMP2, which assesses the knowledge and competence of staff in handling delivery-related queries, had a mean of 5.06, slightly lower than EMP1, and a skewness of -0.824, also indicating a negative skew, though less pronounced. This suggests that while responses were still skewed toward higher ratings, there was relatively more variation than EMP1. The kurtosis value of -0.051 points to a near-normal distribution, suggesting a more balanced spread of responses across the scale. This could indicate that while many respondents perceived staff

as competent, some may have experienced inconsistencies in communication or problem-solving.

To further illustrate how respondents evaluated ODD services' EMP, Figure 10 presents the frequency distribution of responses for the two survey statements. The results indicate that a significant proportion of respondents had positive perceptions of empathy, with 41.43% agreeing or strongly agreeing that the ODD service providers demonstrated genuine concern for their needs (EMP1), while 40% agreed or strongly agreed that the provider's staff was knowledgeable and capable of empathetically handling delivery-related queries (EMP2).

EMP1: Survey statement used to measure Empathy:	Strongly agree	Agree	Somewhat agree	Neutral	Somewhat disagree	Disagree	Strongly disagree
The service provider demonstrated a genuine concern for ensuring that deliveries met my needs during my project.	13.57%	27.86%	22.86%	12.86%	12.86%	5.71%	4.29%
EMP2: Survey statement used to measure Empathy:	Strongly agree	Agree	Somewhat agree	Neutral	Somewhat disagree	Disagree	Strongly disagree
The service provider's staff was knowledgeable and capable of handling delivery-related queries efficiently throughout my project.	16.43%	23.57%	23.57%	12.86%	12.14%	7.14%	4.29%

Figure 10: Frequency matrix of two items used to measure Empathy (EMP)

However, there were also notable proportions of neutral and somewhat negative responses. Specifically, 12.86% of respondents remained neutral regarding EMP1, while 22.86% expressed negative views. Similarly, for EMP2, 12.86% of respondents were neutral, and 23.57% had somewhat negative perceptions of staff knowledgeability.

These results provide valuable insights into the relationship between EMP and SQ within the ODD sector. The generally positive mean scores and slight skewness towards agreement suggest that ODD service providers are perceived as demonstrating empathy in their customer interactions.

In the context of hypothesis H_{1e} , which proposes a significant positive correlation between EMP and SQ, the results lend support to this relationship. However, to establish the strength and significance of this correlation, SEM with further statistical analysis will be presented in the sections to follow. Nonetheless, the results suggest that prioritizing EMP in customer interactions can contribute positively to perceived SQ in the construction material industry's ODD context. Chapter 5 will unpack and discuss these results further.

4.8 Results pertaining to SQ Construct

Table 8 below provides descriptive statistics for the SQ construct, reflecting respondents' evaluations of the ODD service used in their projects.

The overall SQ score, with a mean of 4.456, suggests that respondents generally hold a positive perception of the delivery service. However, the SD (1.07992) reveals some variability in responses, meaning not all participants shared the same perspective. Additionally, the skewness value (-0.595) indicates a slight leftward skew, suggesting that more responses leaned toward the higher end of the scale. This implies that more respondents tended to rate the service above the midpoint, reflecting a generally favourable outlook for service quality.

The kurtosis (-0.271) suggests a distribution that is slightly flatter than normal, implying a moderate spread of perceptions suggesting that there were fewer extreme values and more moderate responses from the ODD users.

Table 8: Descriptive statistics for Service Quality construct

Item	Statement	N	Mean	SD	Skewness	Kurtosis
SQ1	The delivery process was streamlined and integrated well with the operational processes of my project.	108	4.52	1.710	-0.335	-0.768
SQ2	Using this service reduced the time it took to obtain necessary construction materials for my project.	108	5.06	1.617	-0.673	-0.387
SQ3	The cost of delivery services for my project was reasonable considering the quality of service provided.	108	4.94	1.554	-0.788	-0.052
SQ4	The delivery service helped reduce overall material procurement costs for my project.	108	4.63	1.568	-0.237	-0.810
SQ5	The delivery services for my project had additional hidden costs.	108	3.14	1.370	0.522	-0.346

Item	Statement	N	Mean	SD	Skewness	Kurtosis
Overall Service Quality		108	4.4556	1.07992	-0.595	-0.271

NOTE: Table compiled by author

Among the individual items, SQ1 (“The delivery process was streamlined and integrated well with the operational processes of my project”) recorded a mean of 4.52 and the highest SD at 1.710, showing that while many agreed with the statement, the responses varied more widely. Its skewness of -0.335 and kurtosis of -0.768 also point to a left-leaning, flat distribution, possibly indicating differing levels of ODD integration perception across projects. SQ2 (“Using this service reduced the time it took to obtain necessary construction materials for my project”) received the highest mean score at 5.06, with a SD of 1.617, indicating strong agreement among respondents and relatively consistent perceptions. Its skewness of -0.673 reinforces this positive sentiment, with the majority leaning toward agreement, while its kurtosis of -0.387 shows a fairly normal distribution with no sharp peaks or extreme flatness.

SQ3 (“The cost of delivery services for my project was reasonable considering the quality of service provided”) also received a high mean of 4.94, SD of 1.554, skewness of -0.788, and kurtosis close to normal at -0.052. This highlights respondents' perception of ODD services' cost-effectiveness, further emphasized by the relatively symmetric and consistent responses. SQ4 (“The delivery service helped reduce overall material procurement costs for my project”) had a mean score of 4.63, SD of 1.568, and nearly neutral skewness (-0.237), indicating that while views were somewhat dispersed, the general sentiment leaned slightly positive. However, its kurtosis of -0.810 implies a flatter than normal distribution, suggesting a wider range of opinions.

In contrast, SQ5 (“The delivery services for my project had additional hidden costs”) had the lowest mean at 3.14, reflecting some dissatisfaction or concern regarding unexpected expenses. The positive skewness value of 0.522 indicates that most respondents rated this item lower (towards disagreement), which aligns

with a general perception that hidden costs were not a major issue. However, the SD of 1.370 and kurtosis of -0.346 suggest variability in experiences, with a slightly flatter distribution and less consensus.

Overall, the results indicate that respondents perceive the SQ favourably. The slight negative skewness suggests a tendency toward positive evaluations, although some respondents had mixed experiences. These results imply that while ODD services are largely regarded as efficient, more pricing transparency could further enhance customer satisfaction and enhance trust in ODD services. Chapter 5 will discuss these results further.

4.9 Measurement model: reliability statistics results

The following section presents the reliability statistics results obtained through SPSS's scale analysis, which employs the Cronbach's Alpha model, the detailed results is provided in APPENDIX I.

As previously outlined in this chapter's introduction, Cronbach's Alpha is a widely used statistic for assessing the internal consistency of a set of items designed to measure a single construct (Nunnally, 1994). The results, summarized in Table 9, provide an indication of the reliability of the constructs examined in this study.

Table 9: Cronbach's Alpha reliability statistics results

Constructs	Number of items	Cronbach's Alpha
Tangibles	2	0.643
Reliability	2	0.773
Responsiveness	2	0.702
Assurance	2	0.883
Empathy	2	0.648

Constructs	Number of items	Cronbach's Alpha
Service Quality	5	0.763

NOTE: Table compiled by author

The Alpha values presented in Table 9 indicate that the study achieved an acceptable level of internal consistency and reliability. The reliability coefficients for most constructs exceeded the commonly accepted threshold of 0.7, demonstrating strong internal consistency.

However, two constructs, namely, Tangibles (0.643) and Empathy (0.648) have Alpha values below 0.7 but above the minimum acceptable threshold of 0.6. According to Nunnally (1994) and Arli et al. (2024), Alpha values above 0.6 can still be deemed acceptable. Additionally, studies such as Pakurár et al. (2019) have also supported this threshold, reinforcing that these values still indicate a reasonable level of internal consistency for newly developed or adapted scales.

Thus, while the Tangibles and Empathy constructs have slightly lower reliability scores, they remain within an acceptable range for analysis and interpretation.

4.10 Structural Equation Model (SEM) analysis results

The results of the SEM analysis, as depicted in Figure 11 and Table 10 below, provide valuable insights into the relationships between various SQ constructs and their corresponding regression weights. These results will be used to evaluate and determine whether this study's five hypotheses are significantly supported by empirical evidence or otherwise, with significant at $p = 0.05$.

The graphical representation in Figure 11 illustrates the conceptual framework, where five latent constructs of TAN, REL, RES, ASS, and EMP serve as independent variables influencing the dependent variable, SQ.

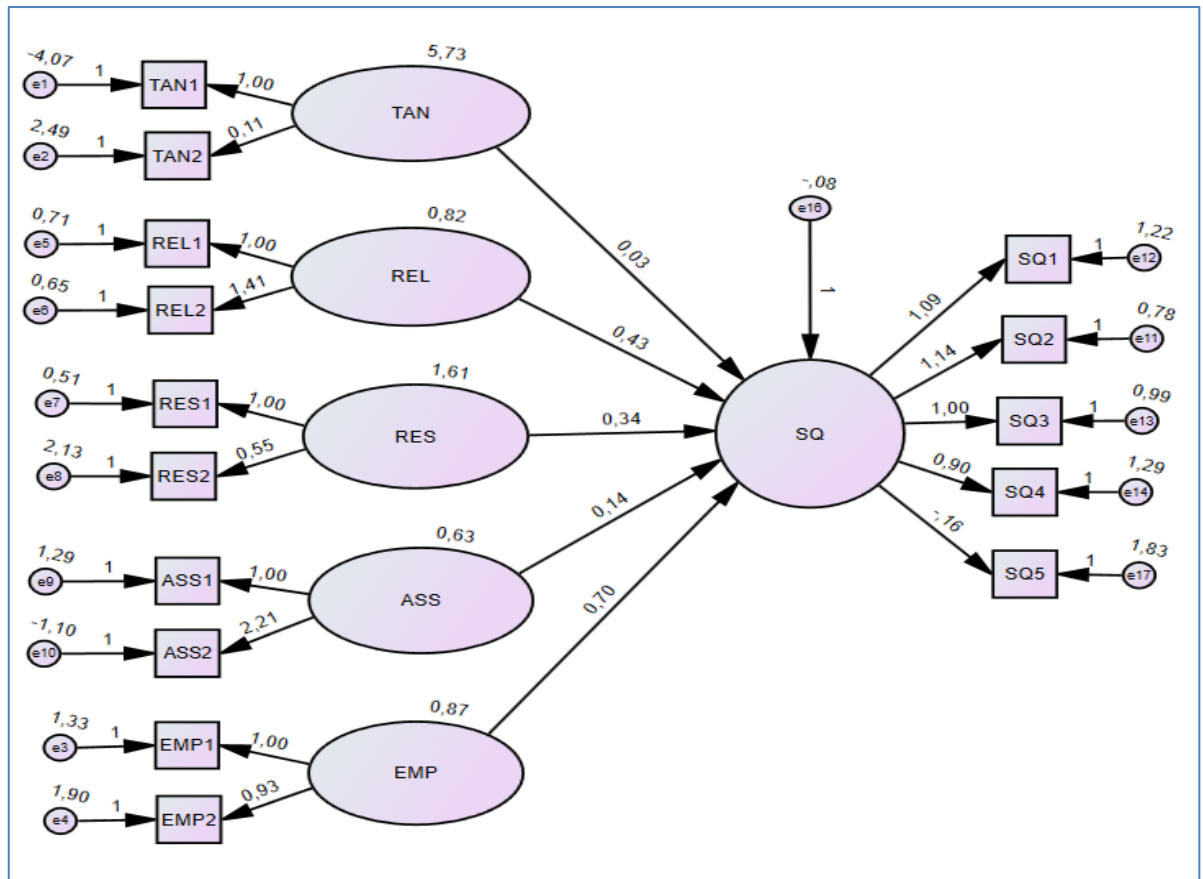


Figure 11: Graphical SEM model representation

Each construct was measured by multiple observed indicators, with standardized regression weights displayed along the connecting paths. These weights quantify the strength of associations between constructs.

The statistical results presented in Table 10 provide a deeper understanding of these relationships by reporting path estimate (β) and significance levels (P-values). Among the key results, EMP emerges as the strongest predictor of SQ with a path estimate (β) of 0.702 ($p < 0.001$). REL and RES also exhibit substantial effects on SQ, with path estimates of 0.428 ($p < 0.001$) and 0.335 ($p = 0.006$) respectively.

Table 10: Results of SEM regression weights

Hypothesis	Relationships (Paths)	Path Estimates (β)	p-value	Decision
H_{1a}	TAN ---> SQ	0.027	0.871	Not Supported
H_{1b}	REL ---> SQ	0.428	***	Supported
H_{1c}	RES ---> SQ	0.335	0.006	Supported
H_{1d}	ASS ---> SQ	0.143	0.035	Supported
H_{1e}	EMP ---> SQ	0.702	***	Supported

NOTE: Table compiled by author

In contrast, TAN is seen to not have a significant impact on SQ ($p=0.871$). ASS, while statistically significant ($p=0.035$), has a relatively lower impact ($\beta=0.143$). These results suggests that EMP, REL, and RES are the most critical drivers of SQ, while TAN and ASS seem to have no significant impact. The detailed version of the regression weights table is provided in APPENDIX J. Chapter 5 will unpack and discuss the results from this section further.

CHAPTER 5. DISCUSSION OF THE RESULTS

5.1 Introduction

This chapter presents a comprehensive discussion of the research results to provide a clear and logical analysis of the results. It begins with a detailed examination of the descriptive analysis, exploring the characteristics of all respondents and highlighting the differences between consumers who utilized ODD services and those who did not. This analysis provides a foundational understanding of the data, setting the stage for further interpretation.

Following this, the chapter delves into a focused discussion on each research hypothesis, critically examining the results in relation to existing literature and theoretical frameworks. This section not only interprets the results but also considers their implications, offering insights into the key factors influencing consumers' perceived SQ in the construction material market.

Finally, the chapter concludes by summarizing the key insights drawn from the analysis, reflecting on their broader significance, and setting the stage for the final conclusions and recommendations of the study.

5.2 Respondents' demographics and delivery service perceptions

The results of this study highlight the critical role of SQ in construction material delivery, particularly in evaluating the difference experiences between consumers who used ODD services and those who relied on traditional delivery methods.

As discussed in the literature, digital technologies, including data analytics, BT, IoT, and e-ticketing, have been pivotal in optimizing SQ dimensions such as reliability, responsiveness, and assurance in the construction material supply chain (Gebretekle et al., 2022; Hallikas et al., 2021; Kang et al., 2023; Monnagaaratwe & Mathu, 2022; Patil & Bhaumik, 2023). The results from both

respondent groups reinforce these perspectives, particularly in relation to customer satisfaction.

5.2.1 *Traditional delivery methods and Service Quality (SQ)*

The report in APPENDIX F presents results from respondents who did not use ODD services, revealing notable inefficiencies in traditional delivery methods.

As illustrated in APPENDIX F and Figure 2, a word cloud visualization highlights recurring concerns, including delays, high costs, broken or damaged materials, and project disruptions. These issues align with findings by Monnagaaratwe and Mathu (2022), who emphasized that supply chain inefficiencies in traditional procurement models often contribute to unreliable SQ.

The dissatisfaction with traditional delivery services is further reinforced by the responses to SQ measures, presented in Figure 3. A significant portion (65.64%) of respondents disagreed that the traditional delivery process was well integrated into their project operations (SQ1). This aligns with the assertion by Hallikas et al. (2021) that traditional procurement models often suffer from fragmented logistics, leading to inefficiencies.

5.2.2 *On-Demand Delivery (ODD) methods and Service Quality (SQ)*

The results from APPENDIX G, detailing the experiences of 108 respondents who used ODD, highlight the benefits of digitally enhanced logistics solutions.

As seen in Figure 4, keywords such as "saved," "quick," "care," and "improved" dominate the feedback, emphasizing perceived high SQ. These results align with the literature's assertion that ODD services enhance SQ, notably via responsiveness and reliability through real-time tracking, digital scheduling, and optimized logistics networks (Alanazi et al., 2022; Gebretekle et al., 2022).

Furthermore, the results in Figure 5 illustrate that 53.7% of ODD users agreed or somewhat agreed that the delivery process was well-integrated into their project operations. This reflects the role of technology in improving supply chain visibility and reducing operational delays (Patil & Bhaumik, 2023; Subramanya et al.,

2023). Furthermore, 71.3% of respondents believed ODD reduced the time required to obtain materials, corroborating findings by Hallikas et al. (2021) that technology, in particular data analytics can optimize procurement timelines.

Figure 5 also indicates that 69.44% of respondents found ODD service costs reasonable, and 58.33% believed it helped reduce overall procurement expenses. This aligns with research by Addy et al. (2023), who argue that digital procurement platforms streamline purchasing and logistics, leading to cost savings. Additionally, 59.26% of respondents disagreed with the presence of hidden costs, reinforcing the transparency benefits associated with digital payment and tracking systems (Kang et al., 2023).

5.2.3 Comparative analysis and alignment with literature

The contrasting experiences between ODD and non-ODD users underscore the impact of digital innovations in construction material supply chains. While traditional delivery users faced challenges in timeliness, cost, and service integration (Figure 3), ODD users reported improved efficiency, reduced costs, and enhanced reliability (Figure 5). These results support existing literature that highlights the role of digital platforms in optimizing SQ dimensions, including tangibility (through e-ticketing and IoT tracking), reliability (via data-driven logistics planning), and assurance (through blockchain-enabled transparency) (Gebretekle et al., 2022; Subramanya et al., 2023).

In conclusion, the analysis of the study's respondents' results reinforces existing research on the transformative role of digital innovations in construction material supply chains. While traditional delivery methods continue to pose significant challenges, the adoption of ODD services, as evidenced by the results in APPENDIX G and Figure 5, aligns with the literature's assertion that digital solutions enhance SQ and customer satisfaction in the construction industry.

5.3 Discussion pertaining to Hypothesis 1

The literature review highlights the significance of TAN as a key dimension of SQ, particularly within the context of ODD in construction materials. According to

Parasuraman et al. (1988) and Arli et al. (2024), TAN aspects including facilities, equipment, and employee appearance play a crucial role in shaping consumer perceptions of SQ. Furthermore, Ngaliman et al. (2019) emphasize that well-maintained physical elements, such as delivery vehicles and service environments, contribute to lasting consumer impressions. These insights led to the formulation of the hypothesis H_{1a} : There is a significant positive correlation between tangibles and service quality in the context of ODD within the construction material industry.

The empirical results presented in Table 3 and Table 10 offer a nuanced perspective on the role of tangibles in SQ. In line with the literature, the results indicate that respondents generally had a positive perception of tangible service aspects. The overall TAN construct received a high mean score of 5.5972, with TAN1, which assesses the physical condition of delivered materials, scoring the highest at 5.85 with a negative skewness of -1.610. This suggests a strong agreement among respondents that the materials met their expectations. Similarly, TAN2, which evaluates the maintenance of service provider facilities and vehicles, also received a positive mean score of 5.34, though with slightly greater variability in responses.

The frequency distribution in Figure 6 further supports these findings, revealing that 71.3% of respondents agreed or strongly agreed that the physical condition of materials met expectations, while 58.3% expressed similar sentiments regarding infrastructure maintenance. These results align with the literature's assertion that tangible service elements, including well-maintained facilities and professional service delivery, positively influence consumer perceptions (Arli et al., 2024; Ngaliman et al., 2019).

Despite this positive perception, the statistical analysis presented in Table 10 contradicts the hypothesis proposed in the literature. The SEM results indicate that TAN do not have a significant impact on overall SQ ($p = 0.871$), leading to the lack of support for H_{1a} . This finding diverges from previous research that suggests tangible elements significantly enhance service quality, customer satisfaction and loyalty (Arli et al., 2024; Yarimoglu, 2014). The results imply that while respondents recognize the importance of tangible service factors, these

elements alone may not be strong enough to influence overall SQ in the construction material sector.

Additionally, Arli et al. (2024) suggest that tangible interactions, such as platform navigation and engagement with delivery personnel, are critical in shaping SQ in ODD services. However, the results suggest that within the construction material industry, other dimensions of SQ such as reliability, responsiveness, or assurance may play a more critical role than tangibles alone.

In conclusion, the results in Table 3, Table 10, and Figure 6 highlight a discrepancy between theoretical expectations and empirical results regarding the role of tangibles in ODD services for construction materials. While the literature asserts that TAN elements significantly influence SQ, the statistical results of this study indicate that these factors may not have a direct or substantial impact within this specific industry.

5.4 Discussion pertaining to Hypothesis 2

This study's results closely align with the literature in recognizing Reliability (REL) as a crucial determinant of SQ within ODD Services.

Both perspectives highlight reliability as the ability to perform promised services dependably and accurately, with strong implications for customer satisfaction and trust (Arli et al., 2024; Parasuraman et al., 1988). The results support these claims through empirical analysis, demonstrating that respondents generally agreed on the reliability of ODD services for construction materials, as reflected in Table 4, which reports a mean REL score of 5.5185. This is consistent with Ngaliman et al. (2019), who emphasize that customers value the dependability of delivery services over other factors.

Additionally, Figure 7 illustrates a strong positive perception of reliability, with REL1 (error-free deliveries) and REL2 (on-time deliveries) both receiving high agreement rates. These findings reinforce the argument by Zygiaris et al. (2022) that reliability is closely linked to accountability and overall service quality.

Furthermore, literature states that reliability fosters customer trust, a key factor in service interactions, particularly in e-commerce (Arlı et al., 2024; Saoula et al., 2023). This study substantiates this claim by demonstrating a significant path estimate ($\beta = 0.428$, $p < 0.001$) between REL and SQ as seen in Table 10, providing strong statistical backing for the hypothesis H_{1b} , which posits a positive correlation between REL and SQ in ODD for construction materials. This quantitative validation strengthens the conceptual framework proposed in the literature, emphasizing that reliability not only enhances SQ but also serves as a key driver of customer satisfaction and loyalty.

In conclusion, the study largely supports the literature, confirming that reliability significantly influences SQ and customer satisfaction in ODD services. The alignment between theoretical claims and empirical findings strengthens the argument that error-free deliveries, fulfilment of promises, and timeliness are crucial reliability attributes. These results reinforce and expand upon previous studies and ultimately supports H_{1b} with strong empirical evidence.

5.5 Discussion pertaining to Hypothesis 3

The literature review establishes responsiveness as a critical determinant of SQ, particularly in the context of ODD services. Responsiveness is defined as a firm's willingness to assist customers promptly and effectively address their needs (Arlı et al., 2024; Parasuraman et al., 1988). Ngaliman et al. (2019) further emphasizes that within an organization, responsiveness reflects the ability of employees to act promptly and convey information in alignment with consumer needs.

The research findings generally support this perspective, as evidenced by the results presented in Table 5, which indicate that respondents perceive ODD service providers as relatively responsive, with an overall mean score of 4.8981 (SD = 1.28026). This suggests a positive perception of responsiveness, reinforcing the theoretical understanding that responsiveness plays a crucial role in shaping consumer perceptions and SQ.

A deeper analysis of the RES construct reveals two key dimensions: quick response to delivery requirement changes (RES1) and flexibility in

accommodating special requests (RES2). The research findings show that RES1 received the highest mean score (5.12) and the lowest SD (1.464), indicating strong and consistent agreement among respondents that ODD providers respond promptly to delivery changes. This aligns with the assertion by Arli et al. (2024) that time is a valuable commodity in ODD services and that quick responses are essential for maintaining strong customer relationships.

However, RES2 had a lower mean score (4.68) and a higher SD (1.622), suggesting greater variability in customer experiences regarding the flexibility of ODD providers. While some respondents acknowledged flexibility in accommodating special requests, others expressed dissatisfaction, reflecting inconsistencies in SQ. The frequency distribution of responses, presented in Figure 8, further highlights this variation. While 50.92% of respondents agreed or strongly agreed that ODD services were quick to respond to delivery requirement changes (RES1), a notable 16.67% disagreed, indicating that some customers still experience delays or inadequate responsiveness.

Similarly, in terms of flexibility (RES2), 34.26% of respondents expressed positive agreement, but a high percentage (23.15%) disagreed, suggesting that while ODD providers are generally responsive, their ability to handle special customer requests is perceived less favourably. This result slightly diverges from the reviewed literature, which primarily focuses on the benefits of responsiveness without addressing potential variability in customer experiences.

Beyond descriptive statistics, the research results provide statistical validation of the relationship between RES and SQ. The literature emphasizes that responsiveness, alongside reliability and trust, is fundamental to ensuring high SQ and enhancing customer satisfaction (Arli et al., 2024). The SEM analysis presented in Table 10 confirms this relationship, showing that RES has a positive path estimate of 0.335 ($p = 0.006$), indicating a statistically significant effect on SQ. This empirical validation supports hypothesis H_{1c} , affirming that RES significantly contributes to SQ in ODD services within the construction material industry.

Overall, the research results largely support the theoretical framework established in the literature while providing a more detailed and nuanced understanding of responsiveness in ODD services. The results confirm that responsiveness positively impacts service quality, as proposed by hypothesis H_{1c} .

5.6 Discussion pertaining to Hypothesis 4

The literature review highlights the critical role of assurance in shaping consumer trust and satisfaction, defining it as the professionalism, knowledge, and reliability of service providers (Parasuraman et al., 1988).

In the context of online supply chain services, Arli et al. (2024) suggest that personalization, security, and system reliability play an integral role in fostering trust. Building on these insights, this study proposed the hypothesis H_{1d} , which posits a significant positive correlation between ASS and SQ in ODD within the construction materials industry. The research findings provide empirical insights into the role of ASS in shaping SQ within the ODD sector.

The results presented in Table 6 and Table 10, along with Figure 9, indicate that respondents generally perceive assurance positively. The mean values for the two assurance survey items, 5.73 (ASS1) and 5.58 (ASS2), suggest that most respondents agree their expectations are being met. Additionally, the overall assurance mean value of 5.6574 reinforces this positive sentiment. These findings align with Mitropoulou and Tsoulfas (2021), who assert that assurance elements such as well-trained employees and security features contribute to customer trust in online service environments. The statistical significance of assurance ($p = 0.035$) further supports hypothesis H_{1d} , confirming that ASS positively influences SQ in ODD services.

Figure 9 shows that 26.43% of respondents strongly agreed and 30.71% agreed that they feel confident using the ODD service (ASS1), a result which reinforces the assertion that trust in service providers enhances customer perceptions, as noted by Zhang and Hou (2013). Moreover, the impact of assurance on customer

satisfaction and loyalty, emphasized by Mitropoulou and Tsoulfas (2021), is reflected in the study results, where a majority of respondents expressed confidence in the service, reinforcing the idea that reducing gaps between customer expectations and service delivery enhances long-term engagement.

However, some notable differences emerge between the literature and the research findings. For instance, the literature review suggest that assurance is a major determinant of SQ (Fan et al., 2017; Mitropoulou & Tsoulfas, 2021), the study results indicate a relatively moderate impact, with a lower path estimate ($\beta = 0.143$). This suggests that while assurance remains significant ($p = 0.035$), its effect on SQ in ODD services is not as strong as what is reported in prior research. This discrepancy may be attributed to contextual factors specific to the construction materials industry, such as logistical challenges or variations in provider capabilities.

In conclusion, the research results provide empirical support for the role of ASS in determining SQ in ODD services for construction materials. While they align with the literature in confirming that assurance fosters trust and confidence, the lower-than-expected path coefficient ($\beta = 0.143$) suggests that its influence may be less pronounced in this industry than in other service sectors.

5.7 Discussion pertaining to Hypothesis 5

The research findings provide empirical support for the role of empathy (EMP) in shaping service quality (SQ) within ODD services in the construction material industry. The literature review emphasized the importance of empathy in customer interactions, with Parasuraman et al. (1988) defining it as the provision of individualized and caring attention. Arli et al. (2024) further highlighted that in online service environments, empathy can be demonstrated through flexible and personalized offerings.

The study's results, as presented in Table 7, align with these insights, showing that respondents generally perceived ODD service providers as empathetic, with an overall mean EMP score of 5.1157 (SD = 1.27632). The slight skewness toward higher ratings (skewness = -0.731) suggests that many respondents had

positive perceptions of the empathy demonstrated by service providers, reinforcing the notion that empathy enhances service quality.

The hypothesis H_{1e} , which proposed a significant positive correlation between EMP and SQ, is strongly supported by the study. As indicated in Table 10, empathy emerged as the strongest predictor of SQ, with a path estimate (β) of 0.702 ($p < 0.001$), confirming its substantial influence in this context. These findings are consistent with Mitropoulou and Tsoufas (2021), who asserted that customers hold high expectations for empathy in service provision but often perceive gaps in its delivery. The research results suggest that ODD service providers who prioritize empathetic interactions can positively impact perceived SQ, aligning with Sahu et al. (2023) and Hanh et al. (2024), who emphasized that digital tools could enhance empathy through improved communication and stakeholder relationships.

However, some notable divergences from existing literature emerge, Zhang and Hou (2013) argued that empathy is less relevant in supply chain management (SCM) compared to traditional service industries. Contrary to this, the research findings indicate that EMP plays a critical role in shaping perceived SQ within ODD services, as demonstrated by the strong correlation found in the study ($\beta = 0.702$).

Furthermore, while Figure 10 shows that 41.43% of respondents agreed or strongly agreed that ODD service providers demonstrated genuine concern for their needs (EMP1) and 40% agreed or strongly agreed that staff were knowledgeable in handling delivery-related queries (EMP2), a notable proportion of respondents expressed neutral or negative views. Specifically, 12.86% remained neutral and 22.86% expressed negative opinions for EMP1, while 12.86% were neutral and 23.57% had negative perceptions for EMP2. These mixed responses suggest that while empathy is valued, its execution may not always meet customer expectations across all interactions.

Additionally, the results support Arli et al. (2024), who emphasized that the impact of empathy is amplified when combined with respect, as it fosters stronger customer relationships and enhances overall satisfaction. The high EMP score in

Table 7 suggests that customers generally appreciate empathy in ODD services, reinforcing its role in enhancing SQ. However, Murray et al. (2019) cautioned against excessive use of empathy, which could lead to discomfort or awkwardness for customers. While the study did not explicitly measure customer discomfort, the presence of neutral and negative responses in Figure 10 suggests that some customers may not fully resonate with the perceived empathy displayed by ODD service providers, reinforcing the need for a balanced approach.

In conclusion, the results validate the hypothesis H_{1e} , confirming a strong positive relationship between EMP and SQ in ODD services within the construction material industry. While the results align with most existing literature, they also challenge prior assertions regarding the limited relevance of empathy in SCM. The statistical evidence in Table 10 suggests that prioritizing empathy-driven interactions enhances SQ perceptions, making it an essential factor for customer satisfaction in ODD services. However, the presence of varied responses, as seen in Figure 10, indicates that while empathy is generally appreciated, its implementation should be carefully managed to avoid excessive or ineffective displays.

5.8 Conclusion

This study examined the impact of key service quality (SQ) dimensions on overall service quality in ODD services for construction materials. The results offer empirical insights into the proposed hypotheses, revealing both expected and unexpected relationships.

Contrary to literature-based expectations, the results indicate that tangibles (TAN) do not significantly impact SQ. While respondents acknowledged the importance of physical elements such as material condition, statistical analysis ($p = 0.871$) showed no significant effect on overall SQ. This finding diverges from previous research that suggests tangible elements significantly enhance customer satisfaction and loyalty (Arlı et al., 2024; Yarimoglu, 2014). Although well-maintained facilities and professional service delivery contribute to positive

consumer perceptions (Arli et al., 2024; Ngaliman et al., 2019), the study suggests that these elements alone may not be strong enough to influence overall SQ within the construction materials industry.

Reliability (REL), on the other hand, emerged as a crucial determinant of SQ, confirming the literature's assertion that dependable service execution enhances customer satisfaction (Arli et al., 2024). The study found strong statistical support for the positive correlation between reliability and SQ ($\beta = 0.428$, $p < 0.001$), with high mean scores reflecting strong agreement on timely and error-free deliveries. These results align with previous studies that emphasize reliability as a key driver of trust and accountability in service interactions (Saoula et al., 2023; Zygiaris et al., 2022). The findings validate H_{1b} and reinforce the idea that reliability fosters service credibility, making it a cornerstone of SQ in ODD services (Ngaliman et al., 2019).

Similarly, responsiveness (RES) was found to significantly influence SQ, with a statistically supported path estimate ($\beta = 0.335$, $p = 0.006$). The research revealed that while customers generally perceived ODD providers as responsive, their flexibility in handling special requests showed variability. Some customers reported inconsistencies, indicating that while quick responses to standard delivery requirements are valued, ensuring uniform service responsiveness remains a challenge. These results align with theoretical perspectives while highlighting practical gaps in service execution.

Similarly, responsiveness (RES) was found to significantly influence SQ, with a statistically supported path estimate ($\beta = 0.335$, $p = 0.006$). The research revealed that while customers generally perceived ODD providers as responsive, their flexibility in handling special requests showed variability. Some respondents reported inconsistencies, reflecting gaps in responsiveness (Ngaliman et al., 2019). While the literature primarily highlights the benefits of responsiveness (Arli et al., 2024), the findings provide a more nuanced view, revealing that quick responses to delivery requirement changes (RES1) are valued, but flexibility in accommodating special requests (RES2) remains inconsistent. These results support H_{1c} while identifying areas for improvement in service execution.

Assurance (ASS), which encompasses professionalism, knowledge, and security, was also found to positively influence SQ ($p = 0.035$). However, its impact ($\beta = 0.143$) was lower than anticipated, suggesting a moderate rather than dominant role in shaping SQ. While respondents expressed confidence in service providers, the results indicate that assurance in this industry may not carry the same weight as in other service sectors. Previous literature suggests that assurance fosters customer trust and satisfaction (Mitropoulou & Tsoufas, 2021; Zhang & Hou, 2013), but the lower-than-expected path coefficient indicates that logistical challenges or variations in provider capabilities may affect how assurance contributes to SQ. Despite this, the findings confirm H_{1d} , reinforcing that well-trained employees and security measures play a role in building consumer confidence in ODD services (Fan et al., 2017).

Empathy (EMP) emerged as the strongest predictor of SQ, with a substantial path estimate ($\beta = 0.702$, $p < 0.001$), confirming that personalized and customer-centric interactions significantly enhance SQ perceptions. This contradicts earlier claims that empathy is less relevant in supply chain management (Zhang & Hou, 2013), reinforcing its importance in ODD services. The findings align with studies emphasizing that empathy fosters stronger customer relationships and enhances overall satisfaction (Hanh et al., 2024; Sahu et al., 2023). However, while many respondents valued empathy, a notable proportion expressed neutral or negative views, indicating that excessive or inconsistent displays of empathy could create discomfort (Murray et al., 2019). These results validate H_{1e} and suggest that empathy-driven interactions are crucial in enhancing SQ but must be carefully managed to maintain customer comfort and engagement (Arli et al., 2024).

Overall, the study confirms that reliability, responsiveness, and empathy play pivotal roles in determining SQ in ODD services, while tangibles have a limited direct impact. Assurance, though significant, has a more moderate effect than suggested by previous research.

CHAPTER 6. CONCLUSIONS & RECOMMENDATIONS

6.1 Introduction

This chapter will synthesize the key findings of the study by addressing each research sub-question based on the study results. The discussion will then progress to an integrated conclusion, where the author will consolidate the answers to the sub-questions to form a comprehensive response to the main research question, ensuring coherence and alignment with the study's objectives.

Finally, the chapter will present an overall conclusion, summarizing the study's broader implications, followed by practical recommendations that stem from the findings. These recommendations will provide actionable insights for relevant stakeholders and suggest potential directions for future research.

6.2 Conclusions regarding the research question

This section examines the main research question by systematically analyzing the sub-questions and their corresponding findings. Through this process, the discussion will integrate insights from each sub-question to develop a comprehensive response to the overarching research inquiry, ensuring coherence and alignment with the study's objectives.

The primary research question guiding this study is whether there is a statistically significant relationship between ODD services and service quality in the South African construction material industry. To explore this, the study investigates the extent to which various dimensions of SERVQUAL, namely, tangibles, reliability, responsiveness, assurance, and empathy influence service quality within the industry. Specifically, it examines how tangibles in ODD services affect service quality, the impact of reliability on service quality, the role of responsiveness in

shaping service quality, the influence of assurance on service quality, and the contribution of empathy to overall service quality.

By systematically addressing these sub-questions, this section will provide a structured analysis that leads to a well-rounded conclusion on the relationship between ODD services and service quality in the South African construction material industry.

6.2.1 Conclusion regarding research sub-question 1

The study first examines the research sub-question: "To what extent do tangibles in ODD services influence service quality in the South African construction material industry?".

While previous literature (Arli et al., 2024; Ngaliman et al., 2019; Parasuraman et al., 1988) emphasizes the importance of tangibles such as well-maintained facilities, equipment, and delivery vehicles, this study finds that although these factors are positively perceived by customers, they do not significantly impact overall service quality (SQ). Empirical results show high mean scores for tangible aspects, with 71.3% of respondents agreeing that delivered materials met expectations and 58.3% expressing satisfaction with infrastructure maintenance. However, statistical analysis contradicts the hypothesis, revealing no significant correlation between tangibles and overall SQ ($p = 0.871$).

These findings diverge from previous research, which suggests that tangible service elements strongly influence service quality (Arli et al., 2024; Yarimoglu, 2014). Instead, the results indicate that other SQ dimensions, such as reliability and responsiveness, may play a more prominent role in this industry. The study thus challenges the assumption that tangible aspects alone drive SQ in ODD services for construction materials, suggesting that customers prioritize other service dimensions.

By addressing potential gaps in the literature, this research highlights the need for a more comprehensive approach to evaluating SQ in ODD services within the construction industry. It underscores that while tangible elements contribute to

positive customer perceptions, they are not the primary determinants of service quality in the South African construction material industry.

6.2.2 Conclusion regarding research sub-question 2

This study confirms that reliability significantly impacts service quality in ODD services for the South African construction material industry, directly addressing research sub-question 1.2: "How much does the reliability of ODD services affect service quality in the South African construction material industry?"

Aligning with existing literature, reliability which is defined as the ability to perform promised services dependably and accurately emerges as a key determinant of service quality (Arli et al., 2024; Parasuraman et al., 1988). Empirical results support this, with a high mean REL score of 5.5185 (Table 4) and strong agreement on the importance of error-free (REL1) and on-time (REL2) deliveries (Figure 7). Additionally, the statistical path estimate ($\beta = 0.428$, $p < 0.001$) further validates the positive correlation between reliability and service quality, reinforcing hypothesis H_{1b} .

This study aligns with previous findings that customers prioritize delivery dependability over other service attributes (Ngaliman et al., 2019) and that reliability fosters customer trust in e-commerce and logistics (Arli et al., 2024; Saoula et al., 2023). This study addresses a gap in the literature by offering empirical validation of reliability's role in specialized delivery contexts.

The findings strengthen existing conceptual frameworks, confirming that reliability enhances service quality while driving customer satisfaction and loyalty. In conclusion, the study reinforces the critical role of reliability in ODD services, supporting previous research while adding industry-specific insights to the discussions on service quality.

6.2.3 Conclusion regarding research sub-question 3

This section answers the sub-question: "how much impact responsiveness in ODD services has on service quality in the South African construction material

industry". The findings confirm that responsiveness is a critical determinant of SQ, aligning with previous literature that defines responsiveness as a firm's ability to assist customers promptly and effectively (Arlı et al., 2024; Parasuraman et al., 1988). Respondents perceive ODD service providers as generally responsive, with an overall mean score of 4.8981 (SD = 1.28026), reinforcing the theoretical understanding that responsiveness significantly shapes consumer perceptions of SQ.

This study largely aligns with existing literature but diverges by identifying variability in customer experiences, an aspect not extensively covered in prior research. While responsiveness is widely recognized as beneficial, previous studies do not account for inconsistencies in service delivery. Additionally, this research addresses a gap in empirical validation by using SEM, which confirms a statistically significant positive relationship between responsiveness and SQ (path estimate = 0.335, $p = 0.006$). This provides measurable evidence that responsiveness directly contributes to SQ in ODD services.

In conclusion, responsiveness has a significant impact on service quality in ODD services within the South African construction material industry. While ODD providers are generally perceived as responsive, the inconsistency in handling special requests suggests an area for improvement. This study advances existing research by offering a more nuanced understanding of responsiveness and its influence on SQ, while also providing empirical validation of its role in the industry.

6.2.4 Conclusion regarding research sub-question 4

To address the research sub-question: "To what extent does assurance in ODD services influence service quality in the South African construction material industry?", this study empirically examines the relationship between assurance and SQ in the ODD of construction materials.

The findings align with the broader literature on the role of assurance in service quality. Previous studies (Mitropoulou & Tsoufas, 2021; Parasuraman et al., 1988) emphasize that assurance, comprising professionalism, knowledge, and reliability plays a critical role in fostering consumer trust and satisfaction.

Similarly, research on fast food on-demand deliveries Arli et al. (2024) highlights the importance of security, personalization, and system reliability in enhancing customer trust. In support of these claims, the results of this study demonstrate that respondents perceive assurance positively, with mean scores of 5.73 (ASS1) and 5.58 (ASS2), leading to an overall assurance mean of 5.6574. Additionally, statistical significance ($p = 0.035$) confirms that assurance has a positive impact on service quality, supporting hypothesis H_{1d} . This corresponds with previous findings that well-trained employees and security measures enhance trust in digital service environments (Mitropoulou & Tsoulfas, 2021).

However, this study also reveals discrepancies when compared to existing literature. While prior research suggests that assurance is a dominant determinant of service quality (Fan et al., 2017; Mitropoulou & Tsoulfas, 2021), the findings of this study indicate a more moderate effect, as reflected in the lower path estimate ($\beta = 0.143$). This suggests that while assurance is significant, its impact on service quality within the South African construction material industry is not as strong as in other service sectors.

Furthermore, this study addresses a gap in the literature by providing empirical evidence specific to the South African construction material industry, a sector that has not been extensively explored in prior research on ODD services. While much of the existing literature focuses on general e-commerce or service industries, this study offers industry-specific insights that acknowledge contextual nuances.

In conclusion, this study confirms that assurance contributes positively to service quality in ODD services within the South African construction material industry, aligning with existing research. However, the lower path coefficient suggests that its influence is not as pronounced as in other service domains.

6.2.5 Conclusion regarding research sub-question 5

For this section, the research sub-question under investigation is: "To what degree does empathy in ODD services contribute to service quality in the South African construction material industry?"

The findings of this study provide empirical support for the significant role that empathy plays in shaping service quality (SQ) within ODD services in the construction material industry. Empathy, as defined by Parasuraman et al. (1988), involves the provision of individualized and caring attention, an aspect that has been reaffirmed in digital service contexts by Arli et al. (2024), who highlighted the importance of flexibility and personalization in online service interactions. This study's empirical results, as indicated in Table 7, demonstrate a generally positive perception of empathy among respondents, with an overall mean EMP score of 5.1157 (SD = 1.27632) and a slight skewness towards higher ratings (-0.731). These findings reinforce the notion that empathetic engagement from ODD service providers positively influences SQ perceptions.

Further supporting this conclusion, the hypothesis H_{1e} , which posited a significant positive correlation between EMP and SQ, was strongly validated. Empathy emerged as the strongest predictor of SQ, with a path estimate (β) of 0.702 ($p < 0.001$), confirming its substantial impact. This aligns with Mitropoulou and Tsoulfas (2021), who noted that customers hold high expectations for empathy in service interactions, although gaps in its actual delivery are often perceived. Moreover, Hanh et al. (2024) and Sahu et al. (2023) emphasized the role of digital tools in enhancing empathy through improved communication and stakeholder relationships.

Furthermore, the study supports Arli et al. (2024), who noted that the impact of empathy is amplified when combined with respect, leading to stronger customer relationships and greater satisfaction. The high EMP score indicates that customers generally appreciate empathy in ODD services, reinforcing its importance in SQ enhancement.

In conclusion, the study confirms that empathy plays a substantial role in enhancing service quality within ODD services in the South African construction material industry. The study further highlights that while empathy is generally well-received, inconsistencies in its application may affect overall customer

satisfaction, necessitating a strategic and balanced implementation approach to optimize service quality perceptions.

6.2.6 Conclusion regarding main research question

This study's main question aims to explore the relationship between on-demand delivery (ODD) services and service quality (SQ) within the South African construction material industry. The findings indicate that while some elements of ODD services significantly influence SQ, others have a more limited impact.

Tangibles, such as well-maintained facilities, delivery vehicles, and infrastructure, are generally perceived positively by customers. However, they do not emerge as primary drivers of SQ. This study finds that customers prioritize other service dimensions, such as reliability and responsiveness, over physical attributes. Reliability proves to be a critical factor in determining SQ. Customers in this industry highly value dependable and error-free deliveries, emphasizing the importance of consistency, accuracy, and on-time performance. The findings confirm that reliability fosters trust, satisfaction, and long-term customer loyalty, making it a key focus area for service providers aiming to enhance their service quality.

Responsiveness also plays an essential role in shaping service perceptions. Customers appreciate prompt and effective service assistance, reinforcing the significance of quick problem resolution and clear communication. Although ODD service providers are generally seen as responsive, inconsistencies in handling special requests highlight an area for improvement. Ensuring consistent responsiveness across all customer interactions can further enhance SQ. Assurance, contributes positively to SQ, but its impact appears to be moderate compared to other factors. While it remains an important aspect, its role is secondary to reliability and responsiveness.

Empathy emerges as the most significant factor influencing SQ. Customers highly value personalized and attentive service, and a strong emphasis on empathy fosters better customer relationships and satisfaction. While generally well-received, inconsistencies in empathetic service delivery suggest a need for a

more structured approach to ensuring that customer interactions remain consistently positive and supportive.

Overall, this study confirms that ODD services and service quality are closely linked in the South African construction material industry. However, different service dimensions contribute to varying degrees. While tangibles have little impact, reliability, responsiveness, assurance, and especially empathy play crucial roles in shaping customer perceptions. Among these, empathy and reliability stand out as the most influential factors.

These findings suggest that ODD service providers should focus on enhancing reliability, responsiveness, and empathetic engagement to improve overall SQ in this industry. However, it is important to acknowledge that a key limitation of the study lies in its reliance on non-probability sampling methods. The study recognises that this approach raises concerns about the representativeness of the sample, potentially limiting the generalisability of the findings to the broader population of construction material consumers across South Africa. As suggested in Section 6.4, future research employing probabilistic sampling techniques could enhance the external validity of these insights and offer a more nuanced understanding of service quality dynamics in this context.

6.3 Recommendations

To enhance service quality in the construction materials industry in South Africa, various stakeholders could benefit from strategic improvements based on the study's findings.

Business owners and managers should prioritize service reliability, which emerged as a strong predictor of service quality, with a path estimate ($\beta = 0.428$) and a p-value of less than 0.001. Respondents consistently affirmed the value of timely and error-free deliveries, which foster trust and satisfaction. As such, it is essential that operational strategies prioritize consistent execution, supported by logistics planning, automated tracking systems, and transparent delivery schedules. Responsiveness also demonstrated a significant effect ($\beta = 0.335$, $p = 0.006$), although the variability in handling special requests revealed practical

gaps in service execution. To address this, structured training programs and standardized response protocols should be introduced to ensure that frontline staff can manage customer inquiries and last-minute changes uniformly and efficiently.

Additionally, the study found empathy to be the strongest predictor of service quality ($\beta = 0.702$, $p < 0.001$), indicating that customers highly value personalized and considerate interactions. Therefore, businesses should cultivate a customer-centric service culture that emphasizes personalized and attentive interactions, while maintaining appropriate boundaries to avoid the discomfort associated with overly intrusive behaviour, as highlighted in the findings. Although the results indicate that tangibles did not significantly impact service quality ($p = 0.871$), their indirect influence on customer perception should not be overlooked. That is, businesses must keep in mind that well-maintained delivery vehicles and a professional appearance remain important for projecting service credibility, even if they do not directly influence service quality ratings.

Supply chain and logistics managers must play a leading role in addressing any gaps identified in service reliability and responsiveness to enhance operational efficiency. The high path coefficient for reliability underscores the need to use data analytics to identify inefficiencies and eliminate delivery delays. Similarly, the indicated inconsistencies in responsiveness highlight the importance of flexible yet standardized delivery frameworks. Investing in employee training can reinforce these qualities, while advanced logistics technologies such as AI-driven route optimization and predictive analytics can streamline operations and improve performance.

For ODD service providers, the inconsistencies identified in responsiveness, particularly in handling special delivery requests, call for the implementation of standardized procedures and escalation protocols. Enhancing customer interactions by incorporating empathy into service training will help ensure a consistently positive experience, as this dimension has the strongest link to service quality. Assurance, while statistically significant ($p = 0.035$), had a relatively modest impact ($\beta = 0.143$) suggesting that while customers appreciate knowledgeable and courteous staff, other dimensions such as reliability and

empathy hold more weight. Nevertheless, assurance can be enhanced by maintaining clear communication, providing real-time delivery updates, and ensuring staff professionalism, thereby reinforcing customer confidence in the service.

Additionally, the moderate influence of assurance suggests that service providers should focus on strengthening customer confidence through timely updates, transparency, and professional conduct. Investing in fleet optimization and infrastructure improvements can further support reliability and enhance the overall customer experience.

End-users, including construction companies and individual consumers, can benefit from leveraging digital platforms to track and manage their purchased construction material more effectively. Providing detailed feedback to ODD providers can help highlight areas where responsiveness and reliability may be falling short, facilitating continuous improvement. Furthermore, adopting best practices in procurement planning by aligning schedules with dependable ODD service providers can minimize project delays and enhance efficiency.

Policymakers and industry regulators play a crucial role in shaping the future of ODD services in South Africa's construction materials industry. Establishing regulatory frameworks that promote technological adoption while safeguarding fair competition, data protection, and consumer rights is essential. Standardizing service quality metrics, particularly those related to reliability, responsiveness, and empathetic customer engagement can help ensure consistent service delivery. Furthermore, supporting digital transformation in construction supply chains through targeted incentives and policy measures will foster innovation and operational efficiency. The development of robust consumer protection laws, fair competition standards, and data governance frameworks will also help ensure that the benefits of digital transformation are shared equitably among all stakeholders.

By implementing these recommendations, stakeholders can make informed decisions that enhance service delivery, boost operational performance, and elevate customer satisfaction across South Africa's construction materials

industry. The evidence highlights the need for a multi-faceted approach, with reliability, responsiveness, and empathy forming the foundation for meaningful and sustainable improvements in ODD services. Implementing these strategies will enable stakeholders to effectively integrate ODD services into the industry, ultimately improving both service quality and overall performance across the sector.

6.4 Suggestions for further research

Based on the methodology followed and the identified limitations and scope of this study, this section recommends the following areas for further exploration.

Future research could focus on improving sampling methods to enhance the representativeness of findings. Additionally, obtaining a more balanced sample of consumers who have used ODD services is essential to reduce sampling bias and ensure broader applicability across different demographics, project types, and regions within South Africa.

A deeper exploration of regional and sectoral variations in ODD service effectiveness would also be valuable. Research comparing urban and rural construction markets could provide insights into disparities in service infrastructure and digital adoption. Similarly, sector-specific studies across residential, commercial, and industrial construction projects could reveal unique challenges and requirements for ODD services.

Beyond service quality improvements, research could also assess the environmental and economic implications of ODD services in the construction industry. Analyzing the carbon footprint of logistics operations and evaluating strategies such as route optimization and vehicle electrification could contribute to sustainability efforts. Economic studies on pricing models and cost structures would provide insights into the financial viability and adoption rates of ODD services across different stakeholders.

Lastly, examining regulatory and policy frameworks is essential to understanding how government interventions shape the development of ODD services.

Comparative studies between South Africa and other emerging markets could highlight best practices for integrating ODD services while ensuring fair competition, consumer rights, and data protection.

By addressing these research gaps, future studies can enhance the reliability and applicability of findings, ultimately contributing to a more efficient, customer-focused, and technologically advanced ODD ecosystem within the construction materials industry.

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APPENDIX A: Research instrument

Survey Completion

0%100%

WITS

UNIVERSITY



Wits

Business School

Sculpting global leaders

SECTION (1 of 2):

Key Definitions:

Construction Project: This refers to any personal, residential, commercial, or industrial project, whether new, ongoing, or maintenance-based, that involves the use of construction materials.

On-Demand Delivery Services: This refers to digitally enabled delivery services for construction materials that provide immediate or scheduled delivery directly to a job site, warehouse, or another specified location (e.g., website or app-based construction material ordering platforms that offer direct delivery).

The below set of questions are designed for gathering information related to your recent construction project, including details about the project type, location, size, and material usage:

1. **When was your most recent** construction project completed?

☐ Within the last 6 months

☐ 6 months to 1 year ago

☐ 1-2 years ago

☐ 2-3 years ago

2. In **which province** was this project?

☐ Gauteng

☐ Limpopo

☐ Mpumalanga

☐ KwaZulu-Natal

☐ Eastern Cape

☐ North West

☐ Free State

☐ Northern Cape

☐ Western Cape

3. What **type of construction project** were you involved in?

- ☐ Residential (e.g., home building, renovations)
- ☐ Commercial (e.g., office buildings, retail spaces)
- ☐ Industrial (e.g., factories, warehouses)
- ☐ Infrastructure (e.g., roads, bridges), Other (please specify)

4. What was **your role** in the construction or building project?

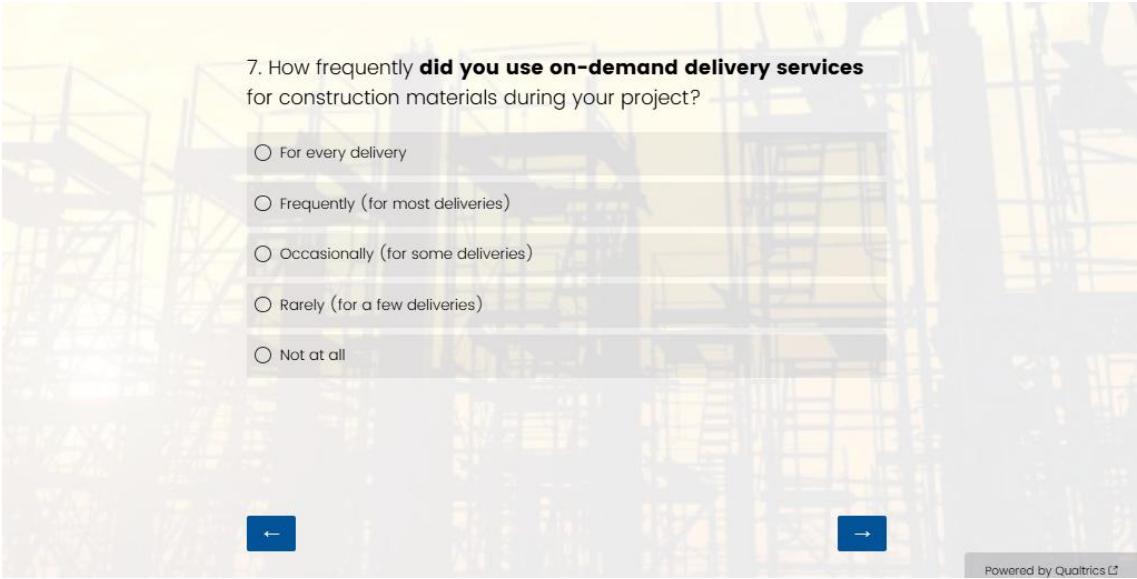
- ☐ Contractor/Builder
- ☐ Client/Property Owner
- ☐ Project Manager
- ☐ Architect/Engineer
- ☐ Procurement Officer
- ☐ Other

5. Which of the following **construction materials** were used in your project? (Select all that apply)

- ☐ Aggregates (e.g., sand, gravel, crushed stone)
- ☐ Cement and Concrete Products
- ☐ Bricks and Masonry
- ☐ Metals (e.g., steel, aluminium)
- ☐ Wood Products (e.g., lumber, plywood)
- ☐ Plastics and Composites (e.g. PVC pipes, plastic sheeting)
- ☐ Finishing Materials (e.g., paint, tiles, glass)
- ☐ Other

6. What was the **approximate size** of the construction project?

- ☐ Small (e.g., single residential house, small renovation)
- ☐ Medium (e.g., multi-unit residential, small commercial building)
- ☐ Large (e.g., large commercial building, industrial facility)
- ☐ Very Large (e.g., large infrastructure projects, multiple buildings)



7. How frequently **did you use on-demand delivery services** for construction materials during your project?

- ☐ For every delivery
- ☐ Frequently (for most deliveries)
- ☐ Occasionally (for some deliveries)
- ☐ Rarely (for a few deliveries)
- ☐ Not at all

←→

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SECTION (2 of 2):

Key Definitions:

On-Demand Delivery Services: This refers to digitally enabled delivery services for construction materials that provide immediate or scheduled delivery directly to a job site, warehouse, or another specified location (e.g., website or app-based construction material ordering platforms that offer direct delivery).

The below set of questions are designed for gathering your experience during your recent construction project:

1. How much do you agree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
The delivery service I used for my project often delivered materials within the promised time frame.	☐	☐	☐	☐	☐	☐	☐
The delivery service provider was quick to respond to any issues or changes in delivery requirements during my project.	☐	☐	☐	☐	☐	☐	☐
The service provider's staff was knowledgeable and capable of handling delivery-related queries efficiently throughout my project.	☐	☐	☐	☐	☐	☐	☐
Using this service reduced the time it took to obtain necessary construction materials for my project.	☐	☐	☐	☐	☐	☐	☐
The delivery process was streamlined and integrated well with the operational processes of my project.	☐	☐	☐	☐	☐	☐	☐

2. (If applicable) please describe any ways in which the delivery service you used improved or hindered your project's efficiency.

3. How much do you agree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
The physical condition of materials delivered for my project met expectations.	☐	☐	☐	☐	☐	☐	☐
The cost of delivery services for my project was reasonable considering the quality of service provided.	☐	☐	☐	☐	☐	☐	☐
The delivery service helped reduce overall material procurement costs for my project.	☐	☐	☐	☐	☐	☐	☐
The service provider's facilities and vehicles were well-maintained and contributed to a smooth delivery process during my project.	☐	☐	☐	☐	☐	☐	☐
The delivery services for my project had additional hidden costs.	☐	☐	☐	☐	☐	☐	☐

4. (If applicable) in your opinion, how does the cost of using on-demand delivery services compare to traditional delivery methods in terms of value for money?

5. How much do you agree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
Overall, the delivery service consistently met my expectations during my project.	☐	☐	☐	☐	☐	☐	☐
Overall, the service provider reliably delivered materials without errors or delays for my project.	☐	☐	☐	☐	☐	☐	☐
The service provider demonstrated a genuine concern for ensuring that deliveries met my needs during my project.	☐	☐	☐	☐	☐	☐	☐
The service provider was flexible and accommodating to any special requests or last-minute changes during my project.	☐	☐	☐	☐	☐	☐	☐
I felt confident that the service provider will fulfil my delivery requirements consistently for my project.	☐	☐	☐	☐	☐	☐	☐

6. (If applicable) have there been instances where the service reliability of the delivery service significantly impacted your project operations? If so, please describe.



APPENDIX B: The participant information page

0% Survey Completion 100%



Greetings,

My name is Sello Madiba. I am a student in Master of Management in the Field of Digital Business (MMDB) program at the University of the Witwatersrand, Johannesburg. My supervisor is Dr Michael Sony.

I am conducting a research study about the impact of on-demand delivery services for construction material consumers in South Africa. The study title is **Assessing On-Demand Delivery's Impact on Service Quality in South Africa's Construction Material Industry using SERVQUAL**.

I am inviting you to take part in a questionnaire. If you decide to take part, your participation in this research study will last for approximately **8 minutes**. The questionnaire will be **confidential and anonymous**. With your permission, other researchers may use the data collected from this research study, but your name and any personal information will remain anonymous.

If you decide to take part in the research study, it should be because you want to volunteer. You can stop participating in the study at any time. You do not have to answer the questions if you do not want to. You will not get any direct benefits if you choose to participate in the research study. You will not lose any services, benefits or rights you would normally have if you decide not to participate. Taking part in the research study will not cost you anything. You will not be paid for being in this research study.

The risks associated with this research study are no greater than those encountered in everyday life. However, If any of the questions cause you to feel uncomfortable, you are free to stop answering and resume the questionnaire at a later time. This research study will be written up as a research report. The report will be available on the university library website. If you would like to receive a summary of this report, I will be happy to send it to you.

If you have any questions during or afterwards about this research study, feel free to contact me or my supervisor on the details listed below. If you have any concerns or complaints about the ethical procedures of this research study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0) 11 717 1408, email hrecnon-medical@wits.ac.za.

Yours sincerely,
Sello Madiba

Researcher:
Sello Madiba, 678472@students.wits.ac.za, 066 389 4151

Supervisor:
Dr Michael Sony, michael.sony@wits.ac.za, 011 717 3817

APPENDIX C: Participant agreement form page

Survey Completion 0% — 100%



Title of Study: Assessing On-Demand Delivery's Impact on Service Quality in South Africa's Construction Material Industry using SERVQUAL.

Name of Researcher: Sello Madiba

By consenting to take part in the study, you agree to the following:

- You have read the information provided about this research study and you understand what this study is about.
- You understand that you are volunteering to participate in the study.
- You agree that your participation will remain anonymous (your name or other identifying data will not be accessible to be used by the researcher in their research report).
- You agree that other researchers may use the information you provide in the questionnaire responses (depending on their own ethics clearance being obtained) but your name and any personal information will remain anonymous.
- You are above 18 years of age.

Do you consent to take part in the study?

☐ Yes

☐ No

APPENDIX D: Ethics Clearance Certificate

Graduate School of Business Administration
University of the Witwatersrand, Johannesburg



Wits Business School Ethics Committee
Constituted under the University Human Research Ethics Committee (Non-Medical)

Ethics Clearance Certificate

Ethics protocol number: WBS/DB678472/621

This certificate is only valid with a legitimate ethics protocol number and signed by the Researcher (below).

Project title	Assessing on-demand delivery's impact on service quality in South Africa's construction material industry using SERVQUAL
Investigator / Researcher	Mr Sello Madiba
Nature of Project	MM (Digital Business)
Decision of the Committee	Approved, provided stakeholders and participants are guaranteed anonymity and confidentiality.
Issue Date of Certificate	24/10/2024
Expiry date	Date of submission of the project / research report
Chairperson	Dr Ayanda Magida ☎ +27 11 717 3953 ✉ ayanda.magida@wits.ac.za

Declaration by Researcher

One copy must be signed by the Researcher and returned to the Chairperson of the Wits Business School Ethics Committee.

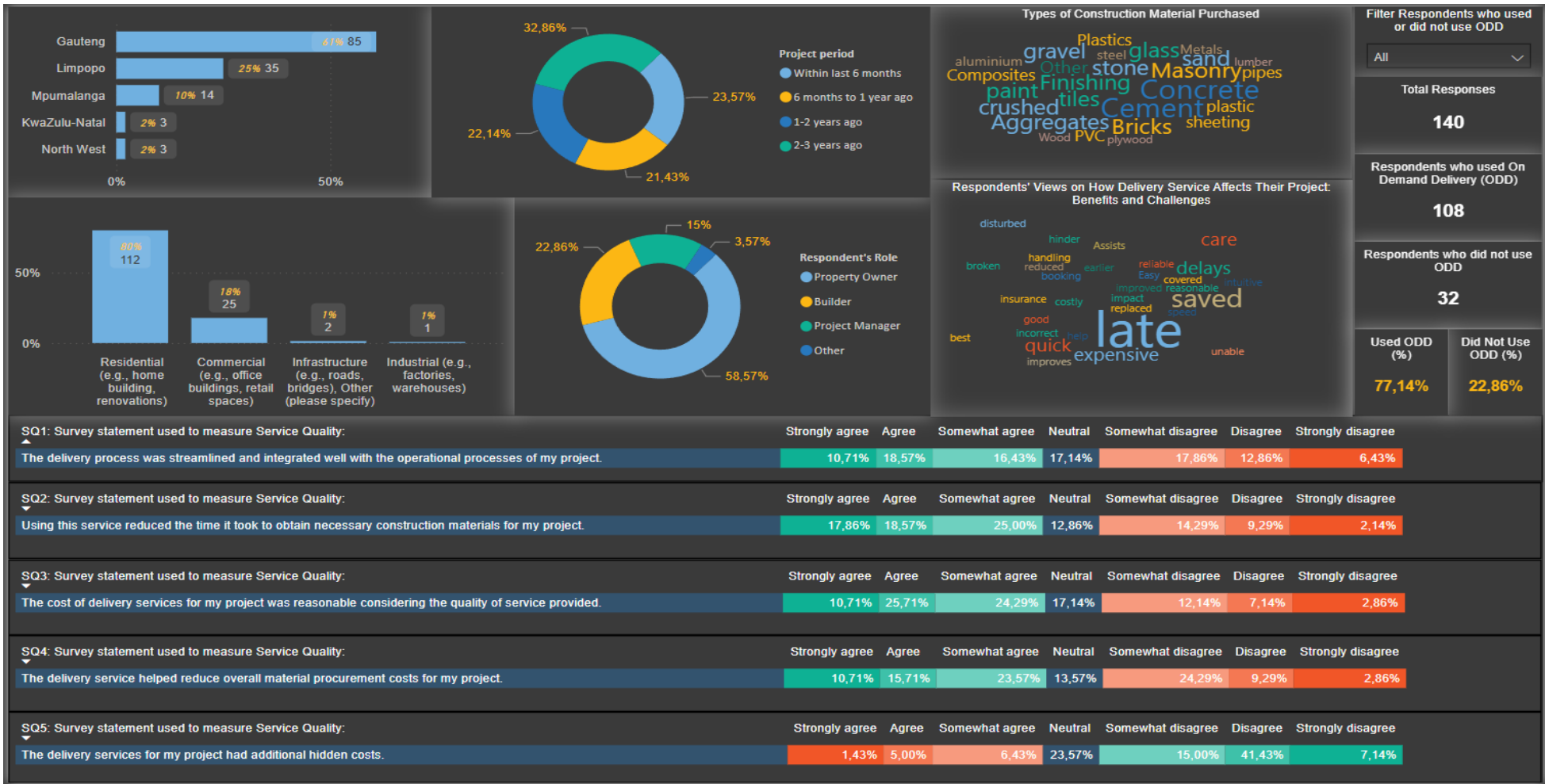
I fully understand the conditions under which I am authorized to carry out the abovementioned research and I guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I undertake to resubmit the protocol to the Committee.

Signature

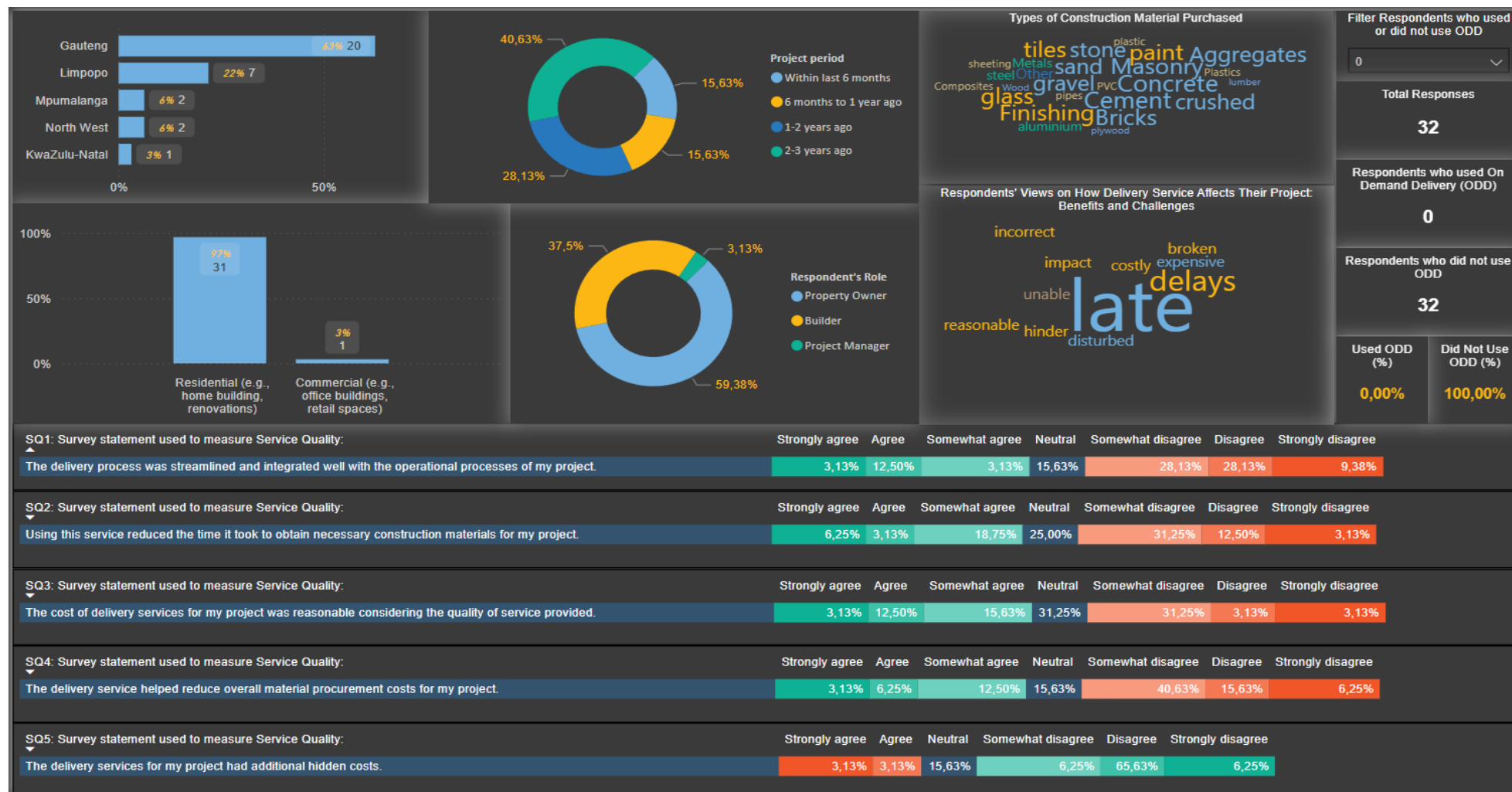
26 October 2024

Date:

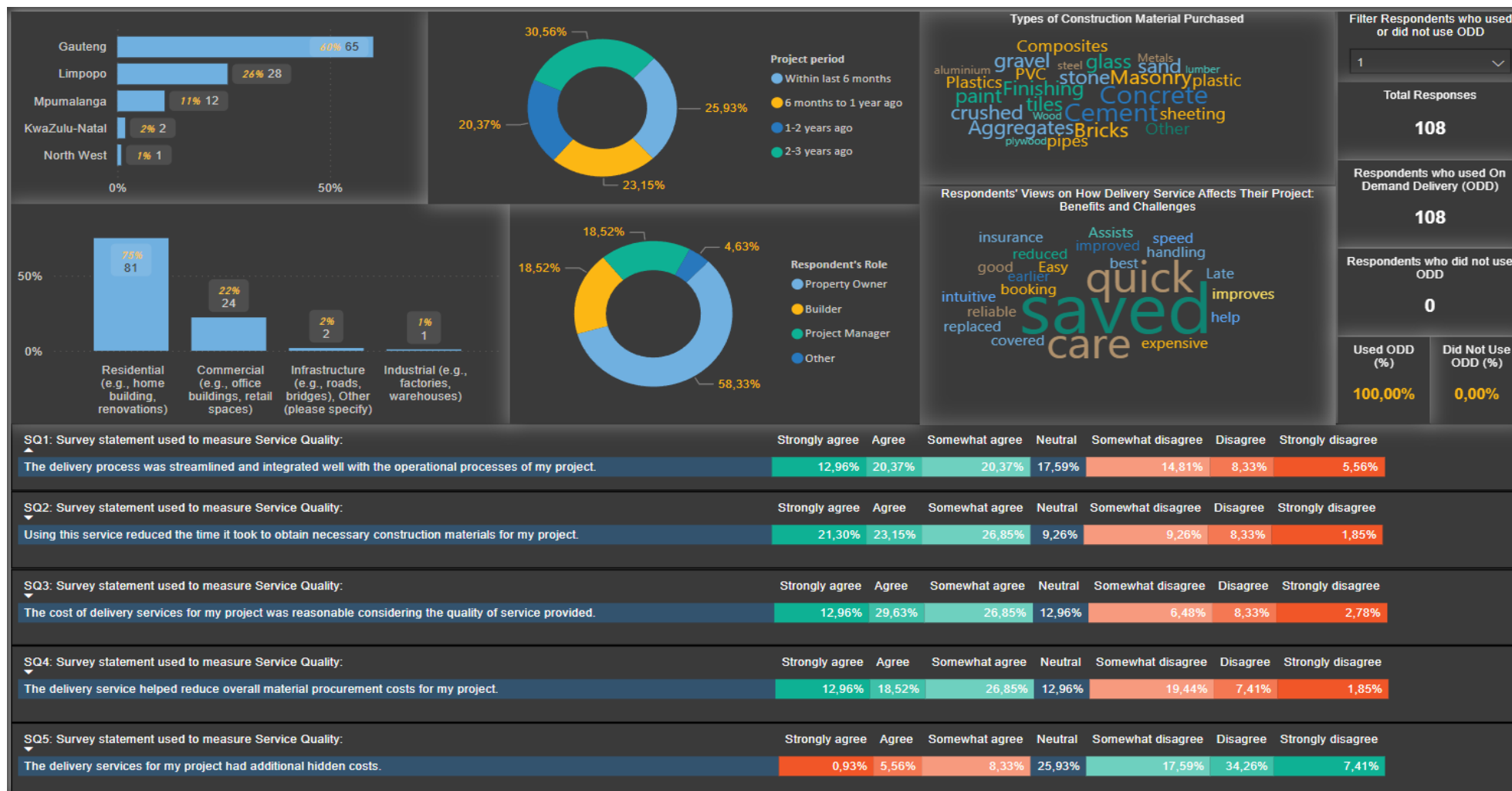
APPENDIX E: Descriptive analysis of all respondents



APPENDIX F: Descriptive analysis of respondents who did not use ODD



APPENDIX G: Descriptive analysis of respondents who used ODD



APPENDIX H: Measures of central tendency and dispersion descriptive statistics

1. Descriptive statistics results for Tangibles:

→ Descriptives

Descriptive Statistics									
	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic	Skewness		Kurtosis	
						Statistic	Std. Error	Statistic	Std. Error
TAN1: The physical condition of materials delivered for my project met expectations.	108	1	7	5,85	1,296	-1,610	,233	2,850	,461
TAN2: The service provider's facilities and vehicles were well-maintained and contributed to a smooth delivery process during my project.	108	1	7	5,34	1,607	-,990	,233	,204	,461
TAN_AVG	108	1,50	7,00	5,5972	1,17302	-,871	,233	,500	,461
Valid N (listwise)	108								

2. Descriptive statistics results for Reliability:

→ Descriptives

Descriptive Statistics									
	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic	Skewness		Kurtosis	
						Statistic	Std. Error	Statistic	Std. Error
REL1: Overall, the service provider reliably delivered materials without errors or delays for my project.	108	2	7	5,51	1,242	-,842	,233	,198	,461
REL2: The delivery service I used for my project often delivered materials within the promised time frame.	108	2	7	5,53	1,513	-,904	,233	-,167	,461
REL_AVG	108	2,00	7,00	5,5185	1,23977	-,976	,233	,305	,461
Valid N (listwise)	108								

3. Descriptive statistics results for Responsiveness:

→ Descriptives

Descriptive Statistics									
	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic	Skewness		Kurtosis	
						Statistic	Std. Error	Statistic	Std. Error
RES1: The delivery service provider was quick to respond to any issues or changes in delivery requirements during my project.	108	1	7	5,12	1,464	-,886	,233	,018	,461
RES2: The service provider was flexible and accommodating to any special requests or last-minute changes during my project.	108	1	7	4,68	1,622	-,489	,233	-,436	,461
RES_AVG	108	1,50	7,00	4,8981	1,28026	-,878	,233	,328	,461
Valid N (listwise)	108								

4. Descriptive statistics results for Assurance:

➔ **Descriptives**

Descriptive Statistics									
	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic	Skewness		Kurtosis	
ASS1: I felt confident that the service provider will fulfil my delivery requirements consistently for my project.	108	1	7	5,73	1,392	-1,371	,233	1,585	,461
ASS2: Overall, the delivery service consistently met my expectations during my project.	108	1	7	5,58	1,415	-1,161	,233	1,369	,461
ASS_AVG	108	1,00	7,00	5,6574	1,29998	-1,446	,233	2,306	,461
Valid N (listwise)	108								

5. Descriptive statistics results for Empathy:

➔ **Descriptives**

Descriptive Statistics									
	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic	Skewness		Kurtosis	
EMP1: The service provider demonstrated a genuine concern for ensuring that deliveries met my needs during my project.	108	1	7	5,18	1,490	-1,033	,233	,796	,461
EMP2: The service provider's staff was knowledgeable and capable of handling delivery-related queries efficiently throughout my project.	108	1	7	5,06	1,634	-,824	,233	-,051	,461
EMP_AVG	108	1,50	7,00	5,1157	1,27632	-,731	,233	-,163	,461
Valid N (listwise)	108								

6. Descriptive statistics results for Service Quality:

➔ **Descriptives**

Descriptive Statistics									
	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic	Skewness		Kurtosis	
SQ1: The delivery process was streamlined and integrated well with the operational processes of my project.	108	1	7	4,52	1,710	-,335	,233	-,768	,461
SQ2: Using this service reduced the time it took to obtain necessary construction materials for my project.	108	1	7	5,06	1,617	-,673	,233	-,387	,461
SQ3: The cost of delivery services for my project was reasonable considering the quality of service provided.	108	1	7	4,94	1,554	-,788	,233	-,052	,461
SQ4: The delivery service helped reduce overall material procurement costs for my project.	108	1	7	4,63	1,568	-,237	,233	-,810	,461
SQ5: The delivery services for my project had additional hidden costs.	108	1	7	3,14	1,370	,522	,233	-,346	,461
SQ_AVG	108	1,40	6,20	4,4556	1,07992	-,595	,233	-,271	,461
Valid N (listwise)	108								

APPENDIX I: Reliability analysis of research constructs

1. Reliability statistics results for Tangibles Construct:

➔ Reliability

Scale: TANGIBLES

Case Processing Summary

		N	%
Cases	Valid	140	100,0
	Excluded ^a	0	,0
	Total	140	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,642	,643	2

Inter-Item Correlation Matrix

	TAN1: The physical condition of materials delivered for my project met expectations.	TAN2: The service provider's facilities and vehicles were well-maintained and contributed to a smooth delivery process during my project.
TAN1: The physical condition of materials delivered for my project met expectations.	1,000	,473
TAN2: The service provider's facilities and vehicles were well-maintained and contributed to a smooth delivery process during my project.	,473	1,000

2. Reliability statistics results for Reliability Construct:

➔ Reliability

Scale: RELIABILITY

Case Processing Summary			
		N	%
Cases	Valid	140	100,0
	Excluded ^a	0	,0
	Total	140	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,768	,773	2

Inter-Item Correlation Matrix

	REL1: Overall, the service provider reliably delivered materials without errors or delays for my project.	REL2: The delivery service I used for my project often delivered materials within the promised time frame.
REL1: Overall, the service provider reliably delivered materials without errors or delays for my project.	1,000	,630
REL2: The delivery service I used for my project often delivered materials within the promised time frame.	,630	1,000

3. Reliability statistics results for Responsiveness Construct:

➔ Reliability

Scale: RESPONSIVENESS

Case Processing Summary

		N	%
Cases	Valid	140	100,0
	Excluded ^a	0	,0
	Total	140	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,699	,702	2

Inter-Item Correlation Matrix

	RES1: The delivery service provider was quick to respond to any issues or changes in delivery requirements during my project.	RES2: The service provider was flexible and accommodating to any special requests or last-minute changes during my project.
RES1: The delivery service provider was quick to respond to any issues or changes in delivery requirements during my project.	1,000	,541
RES2: The service provider was flexible and accommodating to any special requests or last-minute changes during my project.	,541	1,000

4. Reliability statistics results for Assurance Construct:

➔ Reliability

Scale: ASSURANCE

Case Processing Summary

		N	%
Cases	Valid	140	100,0
	Excluded ^a	0	,0
	Total	140	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,883	,883	2

Inter-Item Correlation Matrix

	ASS1: I felt confident that the service provider will fulfil my delivery requirements consistently for my project.	ASS2: Overall, the delivery service consistently met my expectations during my project.
ASS1: I felt confident that the service provider will fulfil my delivery requirements consistently for my project.	1,000	,790
ASS2: Overall, the delivery service consistently met my expectations during my project.	,790	1,000

5. Reliability statistics results for Empathy Construct:

➔ Reliability

Scale: EMPATHY

Case Processing Summary

		N	%
Cases	Valid	140	100,0
	Excluded ^a	0	,0
	Total	140	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,648	,648	2

Inter-Item Correlation Matrix

	EMP1: The service provider demonstrated a genuine concern for ensuring that deliveries met my needs during my project.	EMP2: The service provider's staff was knowledgeable and capable of handling delivery-related queries efficiently throughout my project.
EMP1: The service provider demonstrated a genuine concern for ensuring that deliveries met my needs during my project.	1,000	,479
EMP2: The service provider's staff was knowledgeable and capable of handling delivery-related queries efficiently throughout my project.	,479	1,000

6. Reliability statistics results for Service Quality Construct:

→ Reliability

Scale: Service Quality

Case Processing Summary

		N	%
Cases	Valid	140	100,0
	Excluded ^a	0	,0
	Total	140	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,779	,763	5

Inter-Item Correlation Matrix

	SQ1: The delivery process was streamlined and integrated well with the operational processes of my project.	SQ2: Using this service reduced the time it took to obtain necessary construction materials for my project.	SQ3: The cost of delivery services for my project was reasonable considering the quality of service provided.	SQ4: The delivery service helped reduce overall material procurement costs for my project.	SQ5: The delivery services for my project had additional hidden costs.
SQ1: The delivery process was streamlined and integrated well with the operational processes of my project.	1,000	,730	,577	,523	,103
SQ2: Using this service reduced the time it took to obtain necessary construction materials for my project.	,730	1,000	,605	,634	,046
SQ3: The cost of delivery services for my project was reasonable considering the quality of service provided.	,577	,605	1,000	,635	-,046
SQ4: The delivery service helped reduce overall material procurement costs for my project.	,523	,634	,635	1,000	,112
SQ5: The delivery services for my project had additional hidden costs.	,103	,046	-,046	,112	1,000

APPENDIX J: SEM regression weights

Regression Weights: (Group number 1 - Default model)

		Estimate	S.E.	C.R.	PLabel
SQ	<--- REL	,428	,103	4,157	***
SQ	<--- TAN	,027	,164	,162	,871
SQ	<--- RES	,335	,123	2,734	,006
SQ	<--- ASS	,143	,068	2,114	,035
SQ	<--- EMP	,702	,198	3,549	***
TAN1	<--- TAN	1,000			
TAN2	<--- TAN	,107	,652	,165	,869
EMP1	<--- EMP	1,000			
EMP2	<--- EMP	,926	,221	4,199	***
REL1	<--- REL	1,000			
REL2	<--- REL	1,408	,291	4,832	***
RES1	<--- RES	1,000			
RES2	<--- RES	,546	,202	2,709	,007
ASS1	<--- ASS	1,000			
ASS2	<--- ASS	2,205	1,610	1,370	,171
SQ1	<--- SQ	1,093	,198	5,510	***
SQ3	<--- SQ	1,000			
SQ4	<--- SQ	,903	,184	4,898	***
SQ5	<--- SQ	-,158	,170	-,929	,353
SQ2	<--- SQ	1,135	,185	6,131	***