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The Adoption of the National Traffic Information System (NaTIS) by the Citizens during the Covid-19 Pandemic in South Africa

BY

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DECLARATION AND APPROVAL

I, Rambau Thifhindulwi Maxwell (16013051), declare that this dissertation entitled, **"The Adoption of the National Traffic Information System (NaTIS) by the Citizens during the Covid-19 Pandemic in South Africa**" is my original work and is prepared in fulfilment of the requirements of the Master's degree in Business and Information Systems at the University of Venda. No part of this dissertation has been presented nor submitted for another degree or diploma at this institution or any other university. All chapters in the dissertation contain information from various sources which are fully cited, acknowledged, and referenced.

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DEDICATION

This dissertation is dedicated to my beloved parents, who have been the unwavering source of my aspirations and the embodiment of boundless love and support.

To my father, whose dream is to see me become a doctor one day; your vision and determination have been the guiding light of my educational journey. Your belief in me has been a constant source of motivation, and I strive to honour your dream with every step I take.

To my mother, whose love and sacrifice have nurtured my dreams; your unwavering encouragement and endless care have been the foundation of my strength. Your belief in me has shown me the power of perseverance and resilience.

This work reflects your unwavering faith in me and your enduring love. It is a testament to your dreams and sacrifices, and I dedicate it to both of you with the deepest gratitude and love.

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For this dissertation, I dedicate my appreciation to all those mentioned above, as well as to anyone else whose influence may not be explicitly named but has had a lasting impact on my academic journey.

ABSTRACT

This study examines citizens' engagement with the National Department of Transport services in South Africa, focusing on the NaTIS system. The central issue under investigation is the factors influencing the adoption and utilization of NaTIS among South African citizens. This study identifies and synthesizes several key themes through an extensive literature review. These themes include - the significance of user-friendliness and robust support mechanisms, adaptability to new technologies, working experience, awareness, trust, user preferences, and the role of social influence in technology adoption. Underpinned by the Unified Theory of Acceptance and Use of Technology (UTAUT), this study employs a mixed-method approach, hence, incorporating both quantitative and qualitative methods. It utilizes surveys, factor analysis, and regression analysis to gather and analyse data, thereby, offering a comprehensive understanding of the factors influencing NaTIS adoption.

The study provides empirical insights into citizens' interactions with NaTIS. Key findings emphasize the importance of - user-friendliness, adaptability to new technologies, and social influence - in promoting technology acceptance. These findings present valuable guidance for policymakers and public service managers, to enhance the quality of e-Government services in South Africa. The recommendations offered in the study can contribute to making public services more citizen-centric and technologically-acceptable.

Keywords: e-Government; NaTIS adoption; technology acceptance; user-friendliness; social influence; public service delivery; South Africa.

Table of Contents

LIST OF TABLES

TABLE OF FIGURES

LIST OF ABBREVIATIONS / ACRONYMS

E-Government	Electronic Government
SDT	Self Determination Theory
UTAUT	Unified Theory of Acceptance and Use of Technology
KMO	Kaiser-Meyer-Olkin
SPSS	Statistical Package for the Social Sciences
NaTIS	National Traffic Information System
SA	South Africa
EFA	Exploratory Factor Analysis
IDP	Integrated Development Plan
SARS	South African Revenue Service

CHAPTER 1: INTRODUCTION AND BACKGROUND OF THE STUDY

1.1. Introduction

This study delves into the adoption and utilization of the National Traffic Information System (NaTIS) by South African (SA) citizens during the COVID-19 pandemic. It focuses on the citizens' experiences when accessing traffic testing stations' services using the NaTIS platform and explores strategies to enhance citizens' adoption of such e-government systems. The study was conducted in Tshwane Metropolitan Municipality, Gauteng Province, chosen for its relevance to the research focus and demographics. This chapter provides an overview of - the research's background, the problem statement, research objectives and questions, the significance of the study, the research methodology, as well as an acknowledgment of the study's limitations.

1.2. Background

The year 2020 brought unprecedented challenges to human lives and government agencies with the arrival of the novel Coronavirus (COVID-19, or SARS-Cov-2). This global pandemic reshaped daily lives and exposed vulnerabilities in existing systems (De Vos, 2020; Aristovnik et al., 2020). This resulted in lockdowns, quarantines being implemented, and sudden suspension of in-person services (Gopinath, 2020). In other words, this entailed reorganizing social and economic activities, including schools and non-essential businesses like shopping centres, restaurants, and bars. These restrictions have impacted not only the population's economic activities but also their mobility through reduced traffic flows and the declaration of curfews. In addition, among the various urban systems, transport services were among those that suffered the most impact, particularly in the case of highways (Harantová et al., 2020). Nations were, therefore, compelled to adapt swiftly and decisively to a new and unfamiliar reality. Like many countries, SA was not immune to these disruptions, especially in the same crucial domain – transportation.

The roads once hummed with activity, suddenly became deserted; highways were empty, and traditional traffic services reached a complete standstill. This unexpected urban landscape transformation raised a pressing question: *How do citizens access and utilize vital transportation services in situations such as COVID-19?* In this swiftly

changing environment, the NaTIS, a cornerstone of electronic government (e-government), took on a pivotal role.

The concept of e-government, broadly described as - the digitalization of public services - has never been more relevant. As nations sought to navigate the obstacles posed by the pandemic, the utilization of technology emerged as the saviour for providing essential services, maintaining governance, and ensuring public safety. In SA, the NaTIS system became a beacon of innovation, providing crucial support to citizens as they tried to access and use traffic-related services during these difficult times. This study delves deep into this world of digital advancements, seeking to uncover the intricate dynamics of NaTIS adoption during the COVID-19 pandemic in SA.

According to the latest UN E-government Survey in 2020, SA stands out as a leader in e-Government across Africa, particularly among the world's least-developed countries. It has made remarkable progress in enhancing its e-government performance (UN EGDI, 2020). Notably, SA has some success stories, including implementing online applications, like SARS and NaTIS (e-NaTIS), thereby contributing to its strong e-government ranking. Therefore, understanding the intricacies and nuances of NaTIS adoption, behavioural intentions, and usage remains important. The significance of this research cannot be overstated, given the high stakes involved. The valuable insights gained from this study will inform the development of an e-government framework that fosters effectiveness and inclusivity, paving the way for a brighter and more connected future for SA citizens.

In this context, this study delves into the lived experiences of citizens interacting with the NaTIS during the pandemic. The study aims to uncover the factors influencing citizens' intentions and the determinants of their actual system usage while also examining the advantages and challenges of e-government, particularly in traffic services. Through this exploration, the researcher aims to shed light on how e-government systems, like NaTIS, can effectively adapt to a rapidly evolving world so as to deliver services efficiently, inclusively, and transparently.

1.3. Problem statement

The onset of the global COVID-19 pandemic in 2020 posed unprecedented challenges to developed and developing nations, reshaping societal functions and exposing vulnerabilities in service delivery (Stiegler & Bouchard, 2020). Among the services significantly impacted, transportation stood out due to people's reduced mobility, resulting in deserted roads, empty highways, and a suspension of traditional traffic services. This sudden transformation of the urban transport landscapes raised a pressing question: *How do citizens access and utilize essential transportation services during adverse situations like the Covid-19 era?* In response, governments worldwide attempted using technology to ensure the provision of crucial services, maintain governance, and safeguard public safety.

In this rapidly evolving context, the South Africa NaTIS system emerged as a pivotal component of e-government, playing a vital role during these challenging times, by providing essential traffic-related services to citizens (Roads Authority, 2017). This success underscores SA's leadership and performance in e-Government initiatives however, it is still essential to delve into the complexities of NaTIS adoption, including understanding behavioural intentions and actual usage. These insights are vital, given the high stakes involved, and the fact that they are poised to lay the foundation for an effective and inclusive e-government framework, which will ensure a more connected and promising future for all SA citizens.

1.4. Aim of the study

The aim of this study is to investigate the adoption and use of the NaTIS by the citizens during the Covid-19 pandemic in South Africa and propose a framework that could guide the government in ensuring the widespread acceptance and use of NaTIS services by citizens in South Africa.

1.5. Research questions

1. How are citizens currently accessing the National Department of Transport services in South Africa?
2. What are the acceptance and utilization levels of the NaTIS, by citizens?
3. How can the challenges faced by citizens when accessing the NaTIS system be resolved?

4. What could be done to ensure the widespread adoption and use of the NaTIS by citizens?

1.6. Research objectives

1. To establish the various mechanisms used by citizens to access National Department of Transport services.
2. To measure the acceptance and utilization levels of the NaTIS by citizens.
3. To identify and address challenges faced by citizens during their efforts to access the NaTIS services during the Covid-19 era.
4. To recommend best ways to ensure the widespread adoption and effective use of the NaTIS by citizens.

1.7. Research scope

This study investigated citizens' experiences and interactions with the NaTIS in Pretoria and Centurion City, Gauteng Province, South Africa, focusing on services such as – learners' license bookings, driving license applications, and professional driving permits. By examining the experiences of NaTIS system users and those who rely on traditional over-the-counter services, the research aims to identify challenges related to system acceptance and potential areas for improvement. By employing a mixed-research approach and collecting data through a survey with open - and close-ended questions, this study sought to enhance the adoption and effectiveness of the NaTIS system, for citizens in SA.

1.8 Significance of the study

This research will contribute to the growing body of knowledge within the domain of e-government by investigating the practical implications of its services in traffic management. Findings from this study will provide valuable insights for policymakers, facilitate informed decision-making regarding e-government policies and initiatives. Furthermore, the study will offer input for the design and enhancement of government services, intending to make them more user-friendly and efficient, thus benefitting citizens and increasing trust in government services. Additionally, the outcomes will help to addresses the digital divide by identifying barriers to access, hence, ultimately fostering digital transformation and inclusivity in the SA society. This research seeks to enhance the adoption and effectiveness of the NaTIS system, streamlining

processes, reducing waiting times, increasing citizen satisfaction and trust, and bridging the digital divide in society.

1.9. Operational definitions

This section clarifies key variables used in this study.

Citizens' Lived Experiences

In this study, "citizens' lived experiences" are defined as the subjective perceptions, behaviours, and interactions of individuals with the NaTIS system, when accessing services, such as - vehicle ownership transfer, learners' license bookings, and applications for driving license and professional driving permits, during circumstances similar to the COVID-19 pandemic.

NaTIS System Usage

The "NaTIS system usage" refers to actions taken by individuals to access and utilize the NaTIS for traffic-related services. It includes online interactions with the NaTIS platform for scheduling of services.

Challenges Encountered

"Challenges encountered" are obstacles, issues, or difficulties citizens face when using the NaTIS system or traditional over-the-counter service delivery methods. These may involve technical problems, time constraints, or other factors affecting the efficient utilization of the system.

System Acceptance

"System acceptance" represents the willingness and readiness of citizens to embrace and use the NaTIS system for accessing traffic-related services. It includes factors influencing their decision to adopt this e-government service.

Areas for Improvement

"Areas for improvement" are specific aspects of the NaTIS system identified by citizens that could be enhanced to meet their needs and expectations better. These areas may include - user interface design, accessibility, and system functionality.

Mixed-Research Approach

The “mixed-research approach” combines qualitative and quantitative research methods, and for this study, the approach enabled the collection of data through surveys consisting of open and close-ended questions, to gain insights into citizens’ experiences with the NaTIS system.

Coronavirus Disease 2019 (COVID-19)

In the context of this study, "Coronavirus Disease 2019 (COVID-19)" refers to the global outbreak of the coronavirus disease in 2019 (COVID-19). This disease was caused by the severe respiratory coronavirus 2 (SARS-CoV-2). Coronaviruses are enclosed, positive-sense, single-stranded RNA viruses that manifest in various forms, causing various diseases in humans and animals. These diseases can affect multiple body systems, including the respiratory, enteric, hepatic, and neurological systems (He, Deng & Li, 2020).

1.10. Structure of the dissertation

Chapter 1: Introduction and background

This chapter provided an overview of the study, and a brief outline of what readers can expect. It included but was not limited to the background of the research study, the problem statement, the purpose and objectives of the study, and the significance and limitations of the study.

Chapter 2: Literature review

This Chapter comprehensively reviews relevant literature, theories, and previous studies on e-government, the impact of COVID-19 on government services, and the adoption of the NaTIS system.

Chapter 3: Research Design and Methodology

This Chapter outlines the research philosophy, design, data collection methods, and the analysing techniques employed in the study.

Chapter 4: Data Presentation and Analysis

This Chapter focuses on a presentation of the collected data from the surveys and comments from participants as well as a detailed analysis of these findings. The

Chapter also refines the proposed framework, described in Chapter Two, based on the findings.

Chapter 5: Discussion and Conclusions

This Chapter presents an interpretation of the findings in the context of the research questions and objectives and indicate the implications of the results. This final chapter of the study summarizes the findings and their significance, along with recommendations for policymakers, NaTIS administrators, and future research.

1.11. Chapter summary

In summary, this chapter forms the foundation for the study, investigating the utilization of the NaTIS by SA citizens during the COVID-19 pandemic. It comprehensively overviews the research background, problem statement, objectives, and questions. Additionally, the chapter emphasizes the significance of the study in the context of e-government services, particularly in South Africa, and acknowledges the limitations of the research. The inclusion of operational definitions ensures clarity in understanding the essential variables used throughout the study. Furthermore, the insights gained from this study will contribute to the development of an e-government framework that is both effective and inclusive, ensuring a brighter and more connected future for SA citizens.

CHAPTER 2: LITERATURE REVIEW

2.1. Introduction

According to Snyder (2019), a literature review can generally be described as a systematic way of collecting and synthesising previous studies. The author describes a well-conducted and effective literature review as one that creates a firm foundation for advancing knowledge and facilitating theory development. A literature review can address research questions by integrating findings and perspectives from many empirical findings on the same or similar topic.

The literature review can also help uncover areas where more research is needed, a critical component for creating theoretical frameworks and building conceptual models. This section reviews similar works and studies forming the foundations for this study. The literature selected for this study, include those from journals, articles, books, internet, and selection of published conference proceedings.

2.2. E-Government within the South African context

The era of e-government has been with us for the last decades (PSA, 2019) as governments worldwide started implementing digital initiatives at different local and national levels in the late 1990s (Blom & Uwizeyimana, 2020). In South Africa, the first e-government programme was introduced in the late 90s (DPSA, 2001). The first initiative was the ICT Agency - State Information Technology Agency SOC Ltd (SITA) in 1999 - to enhance service delivery, ensure the inclusion of all citizens and improve cooperation among government, community, stakeholders, and various partners (Isaacs, 2007).

DTPS (2017) states that the South African government drafted a national e-government strategy to digitalise government services. This strategy aimed to provide universal access to government information and services 24/7 and anywhere in the geographical area of South Africa and beyond. The government of South Africa is following the example of many governments worldwide, which have taken advantage of e-services to fulfil its task in a secure, reliable, and cost-effective way (Cloete, 2012).

The State Information Technology Agency (SITA) is an entity administered by the government to oversee its execution of e-government programmes. SITA's mission is to render an efficient and value-added Information and Communications Technology (ICT) service to the public sector in a secure, cost-effective, and integrated manner, thereby, contributing to citizen convenience.

Utilising computers and the internet has become a vital success element in adopting e-government, therefore, the poor, rural communities and computer-illiterate individuals lacking these skills have become marginalised and socially isolated. Khan (2018) argues that people without internet connectivity or smart devices are unable to use online services offered by e-government in South Africa.

According to the 2019 Stats SA General Household Survey (GHS), over 63% of homes in South Africa have access to the internet. The number of people in rural areas with internet access devices accounts for about 45% (with most of them using mobile devices) as compared to the metro and urban areas contributing about 68% and 64 %, respectively. Concerning provinces, areas with internet access show the highest percentage at 74.2% in Gauteng, while the lowest is 43% in Limpopo. It is obvious that more digital development is taking place in urban areas and cities than in rural areas since the latter areas still face challenges with ICT infrastructure and internet connection.

2.3. E-Government Models

E-government is vital to the efficient and effective delivery of government services to citizens, industries, government departments and various stakeholders, particularly in emerging countries (Al-Mushayt, 2019). These services differ according to users' needs, and this diversity has given rise to the development of the different types of e-government.

There are various e-government delivery models, including the business-to-business transactions (B2B), government to citizens (G2C), government to businesses (G2B), and government to government (G2G). These models were introduced to ensure the delivery of relevant services and to facilitate collaboration between the South African government and its private and public stakeholders (DTPS 2017). These models

enable a more convenient, transparent, and cost-effective service offering (Savoldelli, 2014; Mark, 2017; Al-Mushayt, 2019).

Ntulo and Otike (2013) summed up the e-government delivery models as follows:

Figure 2. 1. E-government models/Interactions (Liywalii & Tembo, 2019).

2.3.1. Government-to-Citizen (G2C)

Dash and Pani (2016) explain the term "government-to-citizen" as the government services received by ordinary people, which cover most government services. The major goal of G2C communication is to provide citizens with a variety of ICT services efficiently and economically and to strengthen the relationship between government and citizens using technology (Beynon-Davies, 2007). One of the benefits identified by Dash and Pani is that G2C helps citizens reduce the time and cost of completing a transaction. A citizen can access the facilities at any time and from any location, making it possible for citizens to perform critical transactions quickly, such as paying administrative fees online (Paliwal, 2020).

2.3.2. Government-to-Business (G2B)

The Government-to-business or G2B is the second major type of e-government category. G2B is the interchange of information and services, such as e-businesses' best practices between the local and central government and the commercial business sector (Paliwal, 2020; Naing, 2019 May). Compared with G2C, G2B provides timely business information, therefore, a business organisation can have easy online access

to government agencies. In addition, G2B plays an important role in business development and upgrades the efficiency and quality of communication and transparency of government projects (Beynon-Davies, 2007; Paliwal, 2020). The main objective of G2B is to reduce difficulties for businesses, provide immediate information, and enable ease of digital communication among e-businesses.

2.3.3. Government-to-Government (G2G)

According to a study done by Paliwal (2020), the Government-to-Government refers to interactions among government organisations, departments, and authorities and other government organisations, departments, and authorities. Paliwal indicates that government agencies can share the same database using online communication, which increases the efficiency of government services. The strategic objective of G2G is to support and simplify governance for government, citizens, and businesses. This process allows for government administration to be more transparent, speedy, and accountable while addressing the society's needs and expectations through efficient public services and effective interaction among the citizens, businesses, and governments (Paliwal, 2020; Naing, 2019 May).

2.3.4. Government-to-Employees (G2E)

Government-to-employees is the least visible sector of e-government. Some researchers consider it an internal part of the G2G sector, although, others deal with it as a separate sector of e-government (Ntulo & Otike, 2013). G2E refers to the relationship between online tools, sources, and articles that help employees maintain communication with the government and their own companies. E-government relationship with employees allows new learning technology in one simple place - the computer. E-governance makes it possible for employees to become paperless, enabling the sending of important documents back and forth to colleagues worldwide instead of printing out these records or faxing them. G2E services also include software for maintaining personal information and records of employees. Some of the benefits of G2E expansion include e-payroll, which maintains the online sources to view salary checks and stubs, to pay bills, and keep records for tax information.

South Africa is not far behind in utilising e-Services to reduce difficulties faced by government and residents; for example, as highlighted earlier, the South African government has introduced e-NaTIS.

2.4. The benefits of using e-government applications by citizens during COVID-19

Most governments in developed and developing countries make tremendous efforts to offer online services to citizens. These uses are increasing, but citizens in developing countries remain less likely to be regular users than their counterparts in developed countries (Roy et al., 2015; United Nations E-Government Survey, 2020). According to a study done by Mustaf et al., (2020), e-government applications are commonly used to improve access to information, foster relationships with the business sector, simplify government service delivery, as well as strengthen accountability and transparency. The eNaTIS is part of e-government and is considered an additional service channel that citizens can use to interact with public administration and government entities. It is, hence, perceived as a tool that may increase citizens' trust and confidence in their governments due to the transparency of the services (Elkadi, 2013).

The use of e-government during the Covid-19 era offered several potential benefits to citizens and businesses and these are discussed below.

2.4.1. Easy access to information and services

Studies done by Kyem (2016) and Bertot (2010) confirm that e-government offers easy access to relevant information and services to citizens, businesses, and government departments, thus, enabling them to make timely and informed decisions. To encourage stakeholders to use digital applications, the information and services on the portals should be up-to-date and, in the format, desired by each sector.

2.4.2. Convenient and improved customer service

According to Nam, (2014), electronic government information and services enable citizens to access them comfortably and conveniently at their homes, thus, e-government was the desirable solution to saving citizens' lives during the pandemic

and the government, money and time. Since e-government information and services were electronically available to citizens, this minimised the waiting time for government officials to assist citizens, ensuring service continuity during the Covid-19 era.

2.4.3. Reduced cost and paperwork

E-government permits online transactions, which in turn minimises unnecessary paperwork. This benefits both the government and businesses, in the form of saved money and storage space, as well as drastically reducing service turn-around time (UN-EGS, 2016). Ultimately, the introduction of e-government, saved citizens from spending money and risking their lives while visiting places like traffic stations, during Covid-19.

The e-NaTIS system is compatible with various technologies and provides real-time relevant data, like fraudulent driving and vehicle licenses. It should, therefore, be acknowledged that the system assisted in controlling the spread of COVID-19 as most services were offered online to citizens.

2.5. Value of e-government to residents/citizens

Compared to the manual method of managing operations, providing e-government services online reduces the processing cost of numerous activities (Ntulo & Otike, 2013). These electronic processes lead to government services that were secure and widely available to facilitate continuous communication, transparency, and accountability.

2.6. Value of e-government to the government

Governments benefit from optimising online product and service supply because the process minimises errors, speeds up service delivery, and enhances transparency and trust among citizens (Alomari, 2014). E-government can, therefore lower the cost of providing services while increasing revenue growth, profitability, efficiencies and improving public trust in the government's ability to deliver products and services effectively.

2.7. Factors affecting the adoption of e-government applications in developing countries

The widespread adoption and use of e-government remain minimal in most developing nations, due to several challenges, which include:

2.7.1. Cost of enhancement and maintenance

Venkatesh et al., (2014) suggest that the technological readiness and awareness of e-government services among citizens remain very low. The technology implementation readiness and digital inclusion, are adversely impacted by the socio-political challenges faced by governments; this in turn impacting on e-governance's success (United Nations E-Government Survey: UN-EGS 2016; Turmanidze et al., 2020)

2.7.2. Inaccessibility

The fundamental role of e-government is to make government information and services accessible and available online (Rose et al., 2015). This means the process must consider the demands of all citizens and respond to them in the most convenient and appropriate way, including being disabled-friendly (Srivastava & Teo, 2009; Mark, 2017). Cloete (2012) argues that online accessibility reduces travelling times, improves the applicability and quality of e-government, provides convenient services, like online payment options, and makes use of applications easy. Al-Mushayt (2019), however, found that numerous third-world countries continue to suffer from the digital and internet divide; South Africa and e-NaTIS are no exception to this. As a result, a government must create an effective telecommunications network to deliver e-government services, particularly in rural regions with limited network access.

The other major problem hampering progress in e-government in South Africa is the lack of access to electricity. An electric system powers the ICT infrastructure for e-government. According to Van der Merwe (2019), about 85% of South Africans have electricity access, while the rest do not have such an access. One of the biggest challenges facing South Africans is lack of access to electricity; South African citizens have been experiencing power supply cuts over the past few years (Blom & Uwizeyimana, 2020).

2.7.3. Lack of experts

The quality of the system and the information it delivers is one of the most important determinants of user satisfaction and continuous usage of the online services by citizens (Teo et al., 2009). Implementing high-quality online services requires assembling the right team of experts, knowledgeable in all aspects of the product, from web development to security and privacy. According to the UN-EGS (2016), governments in developing nations still need to improve quality of its e-products. Krishnan et al., in (2013) similarly argued that there is a strong link between quality perceptions and intent to use, which could affect citizens' acceptance and use of e-products, like the NaTIS.

2.7.4. Trust in e-government and government

Given the inherent risks of transacting and interacting on the internet, trust becomes a critical factor (Mostafa & El-Masry, 2013; Weerakkody et al., 2013). Trust in online services is influenced by several factors, including people's trust in the government, the quality of online services, and personal beliefs (for example, many citizens still prefer to use paper products rather than web services) (Lee et al., 2011; Reddick & Roy, 2013; Munyoka, 2020).

Establishing trust in government by citizens and the business world is a difficult and ongoing process (Srivastava & Teo, 2009). Trust is widely scrutinised in the context of e-government advances, as a major factor impacting citizens’ decisions to adopt and use e-government in developing nations (Abu-Shanab, 2014; Alzahrani et al., 2017; Munyoka & Maharaj, 2019). Some variables that affect trust include - technical problems, insufficient system capabilities, poor network security, lack of technical skills, insufficient security policies and regulations, and the absence of implementation guidelines. E-government’s use is also influenced by social, managerial, and financial challenges (Aladwani, 2013; Carter et al., 2016; Weerakkody, 2019).

2.8. The NaTIS system

The NaTIS system is intended to serve as the information system for the administration of road traffic management legislation. It is also aimed at providing road traffic management officials with comprehensive, precise, up-to-date data and relevant

information to facilitate strategic decision-making and promote road safety (Mutula & Mostert, 2010).

The NaTIS system is basically the information backbone that supports legislation and a great variety of daily functions and transactions related to road traffic at all levels of government. This is because most of the government departments, such as the South African Police Service (SAPS), the South African Revenue Service (SARS), the National Intelligence Agency (NIA), most of the private sector financing and banking institutions, as well as other role players, such as Business Against Crime (BAC) also rely on the NaTIS system for certain information requirements (Ahium et al., 2018).

The National Traffic Act (2008) identifies NaTIS as a key national resource providing various online services, such as details on - vehicle registration and licencing, roadworthiness of vehicles; registration of operators; ordinary and professional drivers' registration and licencing; registration of authorised officers, examiners of vehicles and driving licences; registration of the vehicle and driver testing facilities; recording of road accident information; and recording of road traffic offences.

The first NaTIS system has been in operation for decades now, however, initially, it was only developed to deliver services to citizens through walk-ins to the traffic station offices. Later, the online version of the NaTIS (that is the e-NaTIS) application was developed and made fully operational in 2007. Based on the paper released by the National Traffic Act (2008), the new version of the NaTIS system was developed with a centralised solution consisting of a centralised data centre as well as a disaster recovery site. The disaster recovery is created to only be operational in case of a major system disaster and all the data in the system is duplicated at the disaster recovery site on a real-time basis.

Based on the aspects of the new NaTIS system, it is evident that the system's focus is to provide state-of-the-art technology with maximum interpretability between related systems, which include specialised transactions designed to limit visits by the public to traffic departments, by allowing transactions over the internet and via automated teller machines. Under difficult times like the Covid-19 period, one can clearly see that the NaTIS system is one of the top solutions to help curb the spread of the pandemic and protect the lives of the citizens.

2.9. The use of NaTIS during Covid-19

Ever since the Covid-19, motorists have been left frustrated since they have been battling to get booking slots on the online NaTIS system. Van Der Post 's news articles titled - "Cannot get a licence slot? Here is how you can get help for the troublesome Natis system" and "The online Natis system is a frustrating system for Gauteng motorists", prove this point.

A little hope was brought back by companies helping motorists with booking. For instance, Bezuidenhout, Amelia's Driving Academy's owner, established a Gauteng license booking company in 2021, securing its clients' bookings to do learners' and drivers' tests since it was difficult to get bookings, centrally.

> *"We were forced to become more intricate and sophisticated in the booking-making process due to the competitive nature of getting a booking for our clients. As we expanded, our clients' families and friends enquired about renewal bookings and making learners and drivers test and PDP bookings. We recognised the market for rendering the service to the public.", "Today, we are even rendering our services to other driving schools and organisations who do not have the time or manpower to make the bookings for their clients"* said Bezuidenhout (2021).

This left most motorists with no option but to utilise this Gauteng license booking company, which secures bookings for the public, at a small fee. Based on this, one cannot argue against the fact that the NaTIS is not any closer to being a cost reduction system as users are rather paying extra amounts to secure appointment slots.

Bezuidenhout further states that making the bookings has become a science:

> *"Our staff operate like well-oiled machines. We work together as a team. We understand each other. We type fast. We are sharp as minora blades. The public does not have the time to sit on the system every second of every day. When booking slots are released, they are usually gone within seconds".*

This confirms that the NaTIS website is working, however, it is evident that not every motorist will get a chance to secure a slot since it takes patience, a fast-working computer, and a good network to utilise the system. In line with Al-Mushayt's (2019) findings, this situation negatively affects the applicability and quality of e-government and gives motorists the idea that the NaTIS is not user-friendly, in general.

> *"Their information is submitted via an online form, which motorists have to complete on the website, and upon receiving their details, the data captured is first verified. It then goes onto a system that the company has specifically designed to enable getting the maximum capacity out of the slots released. It is heart-breaking for us because we know the public relies on us to get these bookings secured on their behalf",* Bezuidenhout adds.

Several studies on e-government services have suggested that trust is a cornerstone for long-term e-government adoption (Albesher, 2016). Al-Shafi & Weerakkody (2010) and Al-Sobhi (2011) recognise that citizens might be unwilling to adopt and use e-government services due to their concerns about the safety and confidentiality of their information when conducting online transaction. In addition, in line with Munyoka (2020), The Gauteng License booking is a private company that collects identifying details such as - applicant's ID, license number, email address, and contact numbers – releasing such information needs trust. Many people, therefore, would still prefer using traditional methods, despite their little trust in NaTIS and its poor quality of services.

According to Mariska, a Gauteng license booking company member, various companies are providing similar services:

> *"We solely rely on what the NaTIS system releases. We have to book the available slots. These bookings are worth gold due to the competitive nature of securing bookings, as the public has access to the Natis system, and numerous companies and individuals are rendering the same service we do".*

Having a middleman affects trust and imposes high chances of corruption, however, it seems the public has no alternative.

In February 2021, the Department of Transport launched an online payment system for a range of services under the NaTIS, including paying for driving and vehicle licenses.

> *"The benefit of these services is that motorists and private companies will be transacting directly on the NaTIS, eliminating middlemen who fuel corruption,"* said Mbalula, Minister responsible for Department of Transport. *"The additional enhancements on the system will allow vehicle owners to be alerted quickly if their vehicle information have been cloned."*

As Mbalula indicated, the newly-launched system makes it possible for motorists to renew their licenses, book learners' and driving licenses' tests and PrDP applications, among others. As part of a service delivery model centred on citizens, Mbalula believes it would cut down on crime.

According to the Business Insider SA report, the government online licence payment site was down the day after its big launch, which showed that the system could not handle the traffic, an indication that it is a poor-quality system. As Krishnan et al., (2013) had noted, quality perceptions go hand-in-hand with the intention to use the system, therefore, in support of UN-EGS (2016), the breaking down of the system immediately after its launch, clearly shows that SA needs to improve its e-government systems' quality to gain citizens' confidence in government and technology to achieve their widespread adoption and use.

2.9. Theoretical Underpinnings

Understanding and establishing the conditions that lead to the adoption of information systems by citizens and organisations remain a high priority research issue (Venkatesh & Davis, 2000). This study will focus on two prominent theories: the Self-determination Theory (SDT) and the Unified Theory of Acceptance and Use of Technology (UTAUT) Model, to explain the lived experiences of citizens during their effort to access the NaTIS system and explain their motivation and behavioural intention to use the e-NaTIS system.

2.9.1. Self-determination Theory (SDT)

The Self-Determination Theory (SDT) suggests that people become self-determined when their needs for competence, connection, and autonomy are not fulfilled (Adams, Little & Ryan, 2017). The SDT distinguishes between the two main motivation types - intrinsic and extrinsic. The SDT focuses primarily on intrinsic motivation, which is a prototypical expression of the active integrative tendencies in human nature. Theoretically, intrinsic motivation pertains to activities done "for their own sake" or their inherent interest and enjoyment (Deci & Ryan, 2000). This includes intrinsically motivated behaviours such as - play, exploration, and curiosity - which generate activities to gain knowledge or independence. Such activities provide their own satisfaction and joys and are not dependent on external incentives or pressure.

Having "fun," or exposure to interesting engagement and mastery are also serious organismic business, intrinsic motivation is likely responsible for most of the human learning across the lifespan as opposed to externally-mandated learning and instruction (Ryan & Deci, 2017). Often contrasted with intrinsic motivation is the heterogeneous category of extrinsic motivation, which concerns behaviours done for reasons other than their inherent satisfaction. That is, people are often motivated to act by external rewards such as, money, prizes, and acclaim.

SDT was first published in 1971 and was empirically derived through numerous experiments to test extrinsic motivations on intrinsic rewards (Deci & Ryan, 2011). This theory is widely applied in IS studies to study human behaviour within social contexts (Deci & Ryan, 2012). The theory looks particularly at the effects of social environments on people's attitudes, values, motivations, and behaviours.

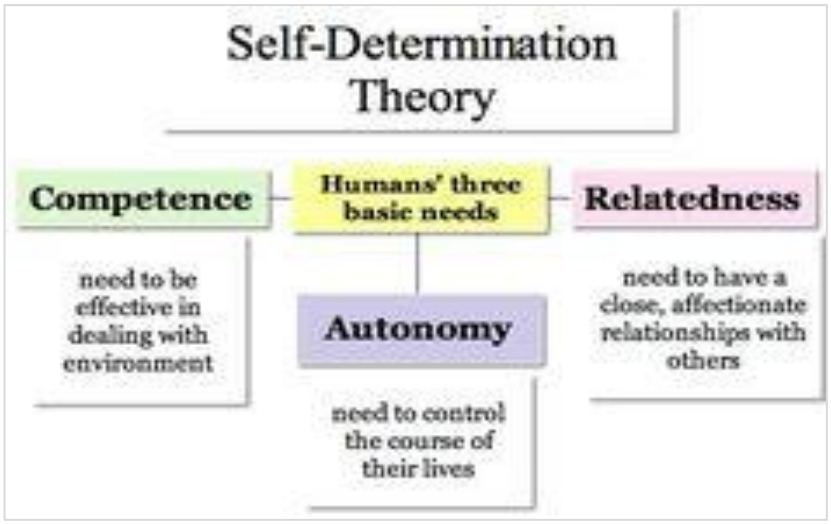

Figure 2. 2. Self-Determination Theory (Deci & Ryan, 2011)

According to self-determination theory, people need to feel the following to achieve psychological growth:

- Autonomy: People need to feel in control of their own behaviors and goals. This sense of being able to take direct action that will result in real change plays a major part in helping people feel self-determined.
- Competence: People need to gain mastery of tasks and learn different skills. When people feel that they have the skills needed for success, they are more likely to take actions that will help them achieve their goals.
- Connection or relatedness: People need to experience a sense of belonging and attachment to other people.

The Self-Determination Theory is relevant to this study as it provides crucial contract variables required to understand factors affecting the adoption and use of the NaTIS system by citizens in South Africa and to frame the conceptual framework of the study.

2.9.2. The Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology (UTAUT) is a technology acceptance model formulated by Venkatesh et al., (2003). The model is a widely used framework for explaining and assessing technology adoption in diverse contexts (Nicholas-Omoregbe, Chiazor, Azeta, & George, 2016). The aim of this study is to establish the adoption and acceptance of the NaTIS by citizens during the Covid-19 pandemic, hence, this objective must be investigated using a theoretical lens which

tries to address all the major aspects of this study. The UTAUT Model has four key constructs (Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions) and four determinant variables (Gender, Age, Experience, Voluntariness of Use) that are pertinent to this study. Figure 2.2 shows the UTAUT model as proposed by Nicholas-Omoregbe, Chiazor, Azeta, & George (2016).

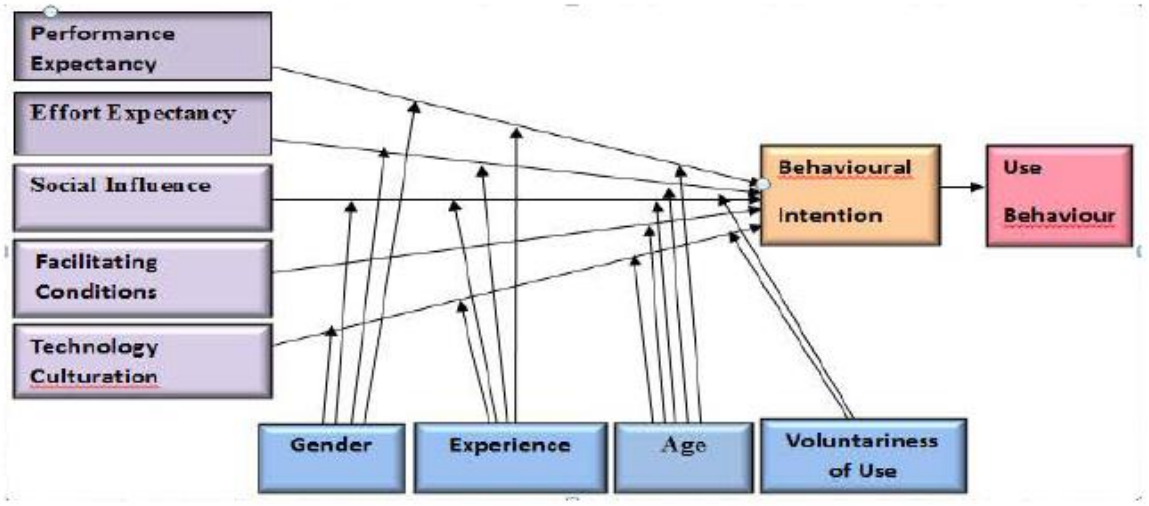

Figure 2. 3. The UTAUT Model (Nicholas-Omoregbe, Chiazor, Azeta, & George, 2016)

The UTAUT model atests that citizens' behavioural intention to adopt a technological innovation is influenced by four factors (performance expectancy, effort expectancy, social influence, facilitating conditions), which in turn are moderated by four determinant variables of - gender, age, experience in use and voluntariness of use. Behavioural intention, in turn, influences one's actual use behaviour. Venkatesh, Morris, & Davis (2003) define the constructs in the sections below.

Performance Expectancy (PE) is the degree to which people believe that employing technology would help them improve their work performance. EE (Effort Expectancy) is the extent of ease which is associated with the use of technology. FF (Facilitating Conditions) refers to the extent to which individuals perceive that the institution's infrastructure (technology, training, funding, availability, and accessibility to technology) exists to enable the usage of the system. SI (Social Influence) is the extent to which the individual perceives the importance of the use of the system, based on

what others believe. The other variables (Gender, Age, Experience and Voluntariness of Use) are used to manage all the different relationships in the model.

The UTAUT model, therefore, provides a valuable theoretical lens to this study to understand factors that influence citizens' behavioral intention and use based on the e-NaTIS systems during the covid-19 pandemic in South Africa.

2.10. Conceptual Framework

Figure 2.3 below shows the conceptual framework supporting the study, and it was derived from the SDT and UTAUT frameworks. In previous studies reviewed, UTAUT variables (Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions) have been used / applied for IS, and the constructs of the SDT (Perceived Competency, Relatedness and Autonomy) have been used to assess the effects on the actual usage and effective use.

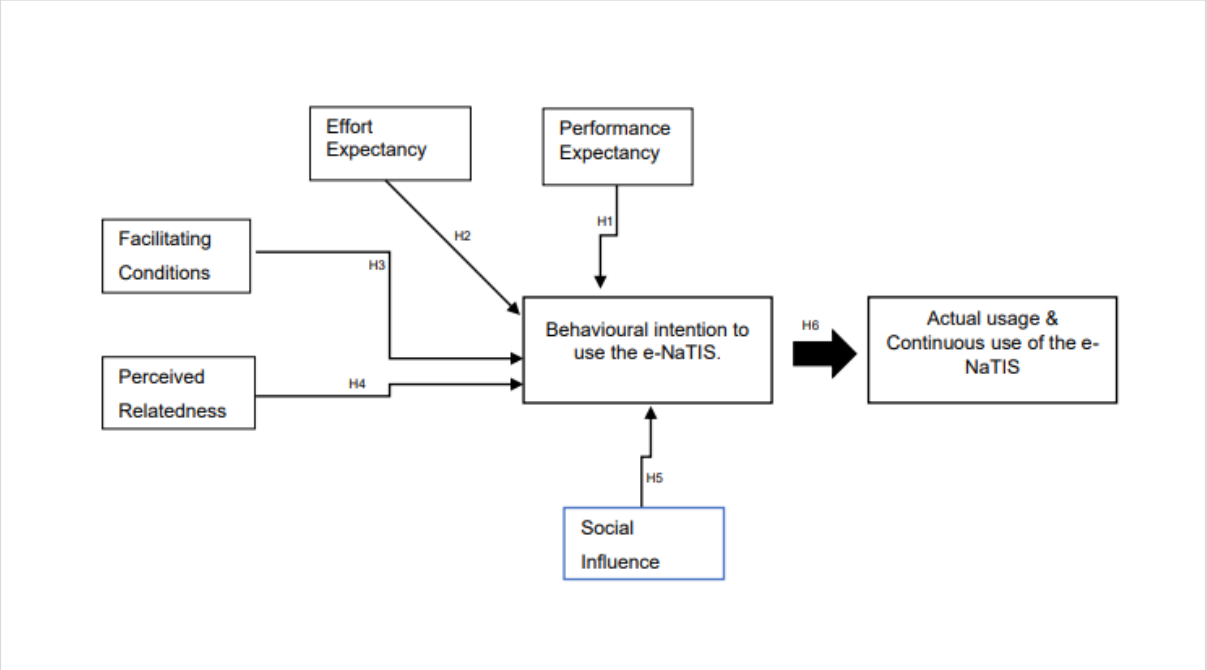

Figure 2. 4. Conceptual Framework

Hypotheses

Based on the reviewed literature and the conceptual framework (Figure 2-3), seven hypotheses were formulated to underpin this study:

$H1_0$: Performance expectancy has no influence on behavioural intention to use the NaTIS system.

H1: Performance expectancy influences behavioural intention to use the NaTIS system.

$H2_0$: Effort expectancy has no influence on behavioural intention to use the NaTIS system.

H2: Effort expectancy influences behavioural intention to use the NaTIS system.

$H3_0$: The facilitating conditions have no influence on behavioural intention to use the NaTIS system.

H3: The facilitating conditions influence behavioural intention to use the NaTIS system.

$H4_0$: Perceived relatedness has no influence on behavioural intention to use the NaTIS system.

H4: Perceived relatedness influences behavioural intention to use the NaTIS system.

$H5_0$: Social Influence has no influence on behavioural intention to use the NaTIS system on non-NaTIS users.

H5: Social Influence influences behavioural intention to use the NaTIS system on non-NaTIS users.

$H6_0$: The behavioural intention to use the NaTIS system has no influence on actual use and the effective use of the system.

H6: The behavioural intention to use the NaTIS system influences actual use and the effective use of the system.

2.11. Chapter summary

This chapter explored the concept of e-government, with a focus on the SA context and highlights the system's pivotal role in enhancing government services, particularly in emerging countries. The discussions introduce various e-government models, including - Government-to-Citizen (G2C), Government-to-Business (G2B), Government-to-Government (G2G), and Government-to-Employees (G2E). These

models are designed to provide more convenient, transparent, and cost-effective services, fostering collaboration between the South African government and its stakeholders. Furthermore, the Chapter outlines the benefits of e-government applications and emphasizes their importance during the COVID-19 pandemic. It explores how e-government offers easy access to information and services, enhances convenience and customer service, reduces costs and paperwork, and contributes to public safety. Various challenges affecting the adoption of e-government applications in developing countries, such as cost, accessibility, the availability of experts, and the trust in government, were detailed. Additionally, the chapter introduces the SDT and the UTAUT as the theoretical underpinnings guiding the research. A conceptual framework is presented, which is essential and instrumental in testing various hypotheses formulated to understand the factors influencing the use of the e-NaTIS system by citizens in SA.

CHAPTER 3: RESEARCH METHODOLOGY

3.1. Introduction

This chapter outlines the research - paradigm, strategy, design, and methodology - underpinning this study. The discussions dwell also on - the target population, sampling technique, sample size, and methods adopted for data collection, as well as ethical issues affecting the study.

Research methodology refers to a dynamic framework that adapts to the evolving nature of research questions (Creswell, 2018; Johnson & Christensen, 2020). It is recognized as not just the theory of methods but a framework encompassing the theories, procedures, and techniques that offer researchers guidance as they go through the multifaceted landscape of their research topics. In the realm of mixed-methods, a recent study by Creswell and Plano Clark (2018) highlights the importance of integrating quantitative and qualitative approaches to enrich the understanding of complex phenomena.

3.2. Research Paradigm

To discover the nature of educational research and understand its underlying philosophy, a researcher must be familiar with various research paradigms and their underlying ontological and epistemological assumptions (Shah & Al-Bargi, 2013; Khatri, 2020). It is essential to understand how these assumptions guide the chosen methodology and methods in relation to the expected findings of the research.

Creswell (2014) defines a “paradigm” as the basic set of beliefs and values that guide research problems. Building upon this foundational understanding of paradigms, Siddiqui (2019) expands the concept to a collection of systematically-connected hypotheses, theories, and proposals. In simpler terms, this broad definition highlights how research paradigms steer the path of scientific exploration and connect various ideas and concepts in a specific field. The author continues that research paradigms act as guiding frameworks that direct thoughts and scientific studies toward specific objectives and outcomes, consequently, they play a pivotal role in shaping the landscape of knowledge within a particular discipline.

In line with the research questions that sought - the acceptance and usage levels of the NaTIS by citizens; the extent of NaTIS adoption; the factors influencing citizens' adoption of the NaTIS as well as citizens' perceptions of the system's effectiveness - the study employed a mixed-methods approach, combining quantitative and qualitative research paradigms. As a result, the study adopted a pragmatism research paradigm, which integrates quantitative and qualitative research methods. Creswell and Cresswell (2017) define pragmatism as - a flexible approach that seeks to address research questions by selecting the most appropriate methods to address the research problem.

3.3. Research Strategy

A research strategy is a systematic process to solve a problem (Rahi, 2017). A research approach is a plan and procedure covering steps from broad assumptions to a more detailed context, including data collection, analysis, and interpretation (Chetty, 2016; Creswell, 2014). The selection of a research approach is primarily based on the nature of the research problem, or the issue being addressed (Chetty, 2016). The researcher's personal experiences and the audiences are no exceptions to this.

There are currently three widely-used research approaches across - the sciences, social sciences, and behavioural sciences (Kakulu, 2014). These are quantitative, qualitative, and mixed-methods research approaches.

The distinction between quantitative research and qualitative research approach is framed in terms of using words (qualitative) rather than numbers (quantitative) or using open-ended questions as opposed to close-ended questions.

3.3.1. Quantitative Research

According to Kakulu (2014), a quantitative research approach is one that generally relies primarily on the collection of quantitative data. Cresswell (2014) refers to a quantitative research approach as testing objective theories by examining the relationship among measurable variables that can be measured using instruments; such numerical data can be analysed using statistical procedures. Kakulu (2014) adds that quantitative research follows the positivist research paradigm.

3.3.2. Qualitative Research

In contrast to quantitative research, a qualitative research approach mainly focuses on exploring and understanding the meaning individuals or groups attribute to a human or social problem around emerging questions and procedures (Creswell, 2014). Kakulu (2014) further describes it as a research approach that relies on the collection of qualitative data and is guided by the constructivist/interpretive research paradigm.

3.3.3. Mixed research

A mixed-methods research approach is a type of inquiry involving collecting both quantitative and qualitative data, integrating the two forms of data, and using distinct designs that may involve philosophical assumptions and theoretical frameworks (Creswell, 2014); hence, it follows pragmatic research characteristics. A mixed-method research is assumed to provide a complete understanding of the research problem than either approaches alone. The research strategy adopted for this study aligns with the mixed-methods approach, combining quantitative and qualitative research paradigms to address the research questions, comprehensively.

3.4. Research design

According to Kumar (2011), a research design is a plan, structure, and strategy for researching to find solutions to a research problem; a case study research design was used in this study. With a case study research design, results obtained can be generalised to a population with similar characteristics to the study's target population. In this case, the target populations were in Pretoria and Centurion City; both situated within the metropolitan area of Gauteng Province.

In addition, the study adopted a sequential exploratory mixed-methods design. This approach starts with collecting and analysing quantitative data, followed by qualitative data collection to provide deeper insights. This sequential approach effectively allows the quantitative phase to guide the development of questions for the qualitative phase. Onwuegbuzie and Combs (2011) emphasise the value of this approach in providing comprehensive answers to complex research questions, hence, would enhance the depth of understanding concerning NaTIS adoption and its influencing factors, making it an ideal design for this study.

3.5 Target population, sampling technique, and sampling frame

3.5.1. Target Population

A population is defined as the collection of available cases of fundamentals suitable for a condition (Weeks, 2020). The target population is the whole group of subjects about whom the researcher is attempting to find out, learn, or understand something and to whom he/she desires to apply the deductions drawn from the findings (Bracht & Glass,1968). Ross (2005) asserts that a well-defined target population provides useful information to help construct a frame from which the sample may be drawn.

The target population for this study encompassed citizens residing in the Gauteng Province, aged 17 and above. Specifically, the focus was on individuals within the areas surrounding Pretoria and Centurion City in Gauteng Province. While this demographic selection aimed to capture diverse perspectives, it is crucial to acknowledge the inherent limitations of such a sampling approach. Limiting the study to specific geographical areas may restrict the generalizability of findings to broader populations beyond these regions. Additionally, focusing on individuals above 17 may overlook potential insights from younger age groups who interact differently with the NaTIS system.

3.5.2. Sampling Technique

Sampling refers to selecting only a small number of populations, events, or objects and analyzing them to discover something about the whole population from which the sample was drawn (Etikan et al., 2016). This study employed two distinct sampling techniques: simple random sampling and convenience sampling.

Simple random sampling was utilized to ensure that each member of the target population had an equal and independent chance of being included in the sample (Latham, 2007; Easton & McColl, 2016). While this approach enhances the sample's representativeness, it is essential to acknowledge its practical challenges, particularly in accessing and obtaining responses from a truly random subset of the population.

Convenience sampling, on the other hand, was employed to gather qualitative data, particularly in the form of open-ended comments related to Likert-scale questions. Participants were selected based on their accessibility, geographic proximity, and

willingness to participate (Etikan et al.,2016). However, it is important to recognize that convenience sampling introduces inherent biases, as individuals who are more accessible or willing to participate may not fully represent the broader population.

3.5.3. Sample Size

According to South African 2019 statistics (SA Stats, 2019), the City of Tshwane had 3 555 741 people in 2017, however, due to the difficulty in extracting the exact population statistics of Centurion and Pretoria City from the 2019 statistics, assumptions will be made based on the 2016 City of Tshwane statistics. In 2016, Tshwane had 3 275 152 citizens, of which 1 593 412 were over the age of 15. The sample formula for proportions was employed, which was as follows:

Sample Size (n) = [(Z^2 * p * (1 - p)) / E^2]

Where Z: Z-score corresponding to the desired confidence level, p: Estimated proportion, and E: Margin of error.

The researcher used a confidence of 95% for better accuracy, giving a margin error of 0.05.

n = [(1.96^2 * 0.5 * (1 - 0.5)) / (0.05^2)]

n ≈ (3.8416 * 0.25) / 0.0025

n ≈ 384.16

Based on the target population for this study, the sample size selected was rounded up to 400 participants to whom survey questionnaires were distributed. The sample consisted of all citizens with experience in the traffic testing stations (all citizens who have used the services.)

The above sample size was determined based on statistical calculations derived from the available population statistics. While efforts were made to ensure the adequacy of the sample size, it is essential to acknowledge the potential limitations associated with sample size determination. Variations in response rates, non-response bias, and other unforeseen factors may impact the generalizability of findings and the overall statistical power of the study.

Overall, while the sampling techniques employed in this study were selected based on their appropriateness to the research questions and constraints, it is important to recognize their inherent limitations. Acknowledging these limitations enhances the transparency and credibility of the study findings, allowing readers to interpret the results within the context of the sampling framework.

3.6. Data collection procedures

Data can be collected from multiple sources and can be categorized as either primary or secondary. Secondary data refers to data already collected and analyzed, such as data extracted from articles and magazines (Johnston, 2017). On the other hand, Cresswell (2014) defines primary data as the data collected directly from the source for a specific research goal. In this study, both primary and secondary data will be used. This approach enables validation of findings, addresses research gaps, strengthens research quality, and contributes to its significance. Primary data will be collected using survey questionnaires, and secondary data will be collected from information from the NaTIS and similar recent studies.

3.6.1. Survey questionnaire

The primary data collection instrument for this study was a structured survey questionnaire. A questionnaire is a well-established tool within social science research for obtaining information on participants about their social characteristics, present and past behaviour, standards of behaviour or attitudes and their beliefs and reasons for action concerning a topic under investigation (Patten, 2016). The questionnaire was designed to collect quantitative data on participants' perceptions and experiences related to the NaTIS system. Data collected included their demographic information, adoption factors, and usage patterns. As inspired by recent studies conducted by Johnson et al., (2020) and Smith and Brown (2019), Likert-scale questions were included for participants to share their perceptions by rating their agreement or disagreement with the statements regarding various factors affecting NaTIS adoption and usage.

Open-ended questions were included at the end of each construct question in line with the theoretical framework of the survey questionnaire. This was done to gather qualitative insights. As a result, participants were encouraged to provide comments as

an alternative way to elaborate on their Likert-scale responses. These comments were analysed to gain deeper insights into the factors influencing NaTIS adoption and usage.

The questionnaire had two sections (A and B); Section A focused on the demographic information of the participants and their computer literacy skills. Section B consisted of information relating to e-government use and practical use of the s NaTIS. It was subdivided into four parts: Part one focused on the participants' knowledge of e-government and its benefits; Part two focused on the participants' use and experience of the NaTIS website; Part three assessed participants' use behaviour and experiences of the NaTIS website, awareness of its potential benefits, and the challenges encountered while accessing the services and Part four focused on participants with had no experience in using the NaTIS website.

3.7. Data Analysis

Data analysis refers to inspecting, cleansing, transforming, and modelling data to discover useful information, suggest conclusions, and support decision-making (Bihani & Patil, 2014). It serves as the cornerstone of this study, offering insights into the complex dynamics surrounding citizens' intention to use the NaTIS. The study adopted a mixed-methods approach, which integrated quantitative and qualitative analyses. This methodological choice ensures a comprehensive exploration of the research objectives, capturing statistical trends and nuanced insights into participants' perceptions and experiences.

3.7.1. Quantitative Analysis

Quantitative data, derived from structured questionnaires, were subjected to thorough analysis using a combination of Microsoft Excel and IBM SPSS Statistics. These tools facilitated the examination of numerical trends and patterns, allowing for the identification of statistically significant relationships among key variables. Initial data cleaning and organization were done in Excel, which paved the way for more advanced statistical analyses in SPSS.

Excel was utilized for its user-friendly interface and basic statistical functions that facilitated the preliminary analysis of the collected data. Descriptive statistics, such as frequencies, percentages, means, and standard deviations, were computed using Excel to gain an initial overview of the dataset. This step was crucial in identifying prevalent trends and patterns in participants' responses, thus providing a foundational understanding of the data. This quantitative lens identified comprehensive themes and patterns, offering valuable insights into the factors influencing citizens' attitudes towards the NaTIS.

Subsequently, IBM SPSS Statistics was employed for more advanced statistical analysis. SPSS is widely recognized for its robust data exploration and analysis capabilities, making it suitable for handling complex datasets (Arkkelin, 2014; Garth, 2008). With SPSS, inferential statistical techniques, including regression analyses, were conducted to examine the relationships between the independent variables (e.g., facilitating conditions) and the dependent variable (e.g., intention to use the NaTIS). Multiple regression analysis was particularly valuable in evaluating the combined effect of these independent variables on citizens' behavioural intentions, thus addressing the research questions effectively.

Regression analysis, as a statistical method, was chosen for its ability to model the relationships between variables and predict outcomes based on these relationships. By employing regression analysis, this study aimed to uncover the factors influencing citizens' intention to use the NaTIS and provide insights into the drivers of adoption.

3.7.2. Qualitative Analysis

Complementing the quantitative approach, qualitative data, consisting of open-ended comments from semi-structured surveys, were subjected to thematic analysis. Following the systematic method outlined by Noble et al. (2022), the qualitative analysis aimed to uncover underlying themes, concepts, and insights embedded within participants' narratives.

The thematic analysis process commenced with data familiarization, wherein researchers immersed themselves in the richness of participants' comments to gain a deep understanding of the content. Subsequently, meaningful phrases or sentences were identified and coded, capturing the essence of participants' sentiments and

experiences. These initial codes were then iteratively grouped into broader themes, reflecting common threads and recurring patterns within the qualitative dataset.

While Excel and IBM SPSS Statistics were chosen as the primary statistical tools due to their widespread use and extensive capabilities in data analysis, alternatives such as R or Python were also considered. However, Excel and SPSS were deemed more suitable for this study due to their accessibility, ease of use, and familiarity among the research team. Although R and Python are also powerful statistical programming languages, they were perceived as potentially requiring more time for learning and implementation, which could have delayed the analysis process.

3.7.3. Integration of Quantitative and Qualitative Insights

The findings from both quantitative and qualitative analyses were seamlessly integrated to offer a comprehensive understanding of the research questions. This integration facilitated the triangulation of results, enabling a more robust interpretation of the research outcomes. Specifically, qualitative insights contextualized and explained the quantitative findings, enriching the analysis with nuanced perspectives and real-world narratives.

By embracing a mixed-methods approach, this study exceeds traditional disciplinary boundaries, offering a holistic examination of citizens' intention to use the NaTIS. The synthesis of quantitative rigour and qualitative depth underscores the richness and complexity of the research findings, ultimately contributing to a nuanced understanding of the factors shaping citizens' attitudes and behaviours in the digital era.

3.7.4. Reliability and Validity

Reliability and validity are two important concepts used to evaluate the quality of research (Sürücü & Maslakçi, 2020). It is essential to consider reliability and validity during the research design, planning of methods, and analysing results, especially in quantitative research, as it enables the research to yield credible results (Middleton, 2020; Sürücü & Maslakçi, 2020). Middleton (2020) notes one main difference between reliability and validity; reliability is about the consistency of a measure and will be estimated by comparing different versions of the exact measurement. In contrast, validity focuses on the accuracy of a measure, and can be estimated by comparing

the results to other relevant data or theories. These concepts indicate how well a method, technique, or test measure something.

3.7.4.1. Reliability

Generally, reliability refers to how a method consistently measures something; therefore, a method is considered reliable if the same result can be consistently achieved using the same methods under the same circumstances (Heale & Twycross, 2015; Middleton, 2020).

In working with the NaTIS, achieving reliability requires that the research instruments (for example, the survey questionnaire) consistently produce the same results when administered to the same individuals or under similar conditions, as this is essential for drawing accurate conclusions from the data. Johnson et al., (2021) discovered that using a reliable survey instrument resulted in consistent responses from citizens across multiple survey administrations on e-government adoption. This demonstrated the importance of a survey's reliability in assessing technology's adoption trends. Based on the time allocated to this study and budget constraints, the questionnaire results were randomly split into two halves to test if there was a strong correlation between the two sets of results, therefore, internal consistency was achieved.

3.7.4.2. Validity

Validity refers to the extent to which a method accurately measures the behaviour or quality that it is intended to measure; it is an indication of how well the measuring instrument performs its function (Price et al., 2015; Sürücü & Maslakçi, 2020). DeVellis (2016) emphasizes the urgency of ensuring the reliability of a measurement instrument to enhance the validity of the research findings. Establishing validity was crucial for this topic, hence, the necessity to confirm that the data collected accurately represents the factors influencing NaTIS adoption and usage. The study adopted content validity to ensure that the questions in the questionnaire comprehensively and accurately addressed the aspects related to the acceptance and use of the NaTIS system, as explained by Wang et al., (2021) in the context of user adoption and acceptance of technology.

A pilot study was conducted with a sample of 30 motorists to evaluate the internal consistency of the questionnaire items. This was done in line with a study conducted by Cortina (1993), which recognized the importance of including large samples in a pilot study as it provides robust reliability results.

The Cronbach's coefficient alpha (α) was used to assess the measurement reliability. The Cronbach's coefficient α was used to calculate the internal consistency coefficients of the items included in the questionnaire. Taber (2018) explains the Cronbach's alpha as a measure used to assess the reliability or internal consistency of a set of scale or test items. It is regarded as one of a measurement scale's most critical reliability estimates, with multi-point items. The pilot study results yielded a Cronbach's alpha coefficient of 0.891, demonstrating good internal consistency based on the framework's guidelines by George and Mallery (2003).

3.7.5. Normality Test

Numerous statistical methods are used for data analysis to make normality assumptions, including correlation, regression, t-tests, and analysis of variance. According to the central limit theorem, the Mean sample distribution of a random variable will assume a near-normal or normal distribution if the sample size is large enough. In other words, violation of normality becomes a minor issue if the sample size has a minimum of 100 observations.

If the obtained data is not normally distributed, the resultant mean will not accurately represent the expected value, leading to the wrong interpretation. Various methods, however, are available to test the normality of continuous data, including the Shapiro–Wilk test, Kolmogorov–Whirnov test, and mean with standard deviation. According to Mishra et al., (2019), the most widely used methods to test the normality of the data are the Kolmogorov–Smirnov test and the Shapiro–Wilk tests. The Shapiro–Wilk test is the most appropriate method for small sample sizes (n <50), although, it can also be used on larger sample sizes. The Kolmogorov–Smirnov test is more appropriate for large sample sizes (n ≥50), hence, based on the sample size of this study, the Kolmogorov-Smirnov test was deemed more a appropriate method, therefore, was adopted.

3.7.6 Trustworthiness

A thorough evaluation was taken to ensure the reliability and validity of the study. For the quantitative aspect, a pilot study was conducted to test internal consistency, yielding a strong Cronbach's alpha coefficient of 0.891. The questionnaire design prioritized content validity, ensuring it covered the factors influencing NaTIS adoption and usage. For the qualitative data, a thematic analysis systematically explored open-ended comments, allowing for in-depth insights. This involved becoming familiar with the data, assigning initial codes, and refining the themes iteratively. The findings from both analyses were integrated to ensure triangulation, providing a robust interpretation of the research outcomes. This integration facilitated a richer understanding of the respondents' answers since the method allowed for contextualizing and explaining quantitative results with qualitative insights.

3.7.7. Exploratory Factor Analysis

According to Watkins (2018), Factor Analysis is a regular method used within the education and psychology fields and is broadly considered as a method of choice for interpreting self-reporting questionnaires. Due to its capabilities, factor analysis is considered a multivariate statistical procedure with many uses. It is able to explains the relationship between a large set of measured variables with a small set of latent constructs. It establishes underlying dimensions between measured variables and latent constructs (Henson & Roberts, 2006; Williams et al., 2010). These constructs can then be used to explain a portion of the variance in the original large set so that the factors or constructs can then be used to represent observed variables (Newsom, 2005; Henson & Roberts, 2006).

Watkins (2018) explicates Exploratory Factor Analysis (EFA) as a multivariate statistical approach to discovering and examining internal reliability. With EFA, researchers usually decide on the number of factors by examining the output from a principal components analysis (Henson & Roberts, 2006). The analysis is often recommended when researchers have no hypotheses about the nature of the underlying factor structure of their measure. Exploratory factor analysis has three basic decision points: deciding the number of factors, an extraction method, and a rotation method.

EFA was the method of choice in this study due to the expansive datasets comprising numerous variables. As derived from the established formula, a sample size of 400 participants was recommended to ensure the accuracy of the results, as this size will ensure that each variable subjected to factor analysis had at least ten observations to ensure stable results.

3.8. Reflexivity

Reflexivity plays a crucial role in qualitative research, acknowledging the researcher's influence on the study's design, data collection, and interpretation (Holmes, 2020). In this section, the researcher reflected on their positionality, biases, and preconceptions that may have impacted the research process.

3.8.1. Positionality

The researcher acknowledged their professional background in Information Systems and recognized its potential influence on the study (Holmes, 2020). Awareness of their positionality helped contextualize their approach to the research and interpretation of findings.

3.8.2. Biases and Assumptions

The researcher was aware of potential biases that may arise, including their positive view of technology's role in service delivery and their familiarity with e-government systems (Olmos-Vega et al., 2023). These biases may have shaped the researcher's perspectives on initiatives like NaTIS. Additionally, personal experiences and beliefs may have influenced interpretations of the data (Holmes, 2020).

3.8.3. Reflexive Practice

The researcher engaged in reflexive practices throughout the research process to mitigate biases and assumptions (Olmos-Vega et al., 2023). This included regular self-questioning, seeking feedback from peers and supervisors, and remaining open to alternative interpretations of the data (Holmes, 2020).

3.8.4. Transparency

By transparently acknowledging their positionality, biases, and reflexive practices, the researcher aimed to enhance the study's credibility and trustworthiness (Galdas, 2017). Therefore, readers could critically evaluate the methodology and interpretations in light of the researcher's reflexivity.

3.9. Ethical Considerations

Various scholars like Patel (2019), Noble et al., (2022), and Son et al., (2019) declares the urgency of ethical considerations in a study.

3.9.1. Informed Consent

Creswell (2009) stresses that a researcher should respect the participants' rights, values, desires, and needs, therefore, participants were provided with comprehensive information prior to the survey's commencement. This included clear explanations regarding the purpose of the study, voluntary participation, and the right to withdraw without any consequences. Additionally, this study was approved by a letter from the University of Venda Research Ethical Committee outlining the protocols for ethical research.

3.9.2. Anonymity and Confidentiality

Maintaining participant anonymity and data confidentiality are critical, as shown by recent studies by Li et al., (2020) and Al-Rahmi et al., (2018); therefore, the researcher did not collect any information related to personal details that could link responses to a specific individual. The researcher, thus, did not request - participants' names, addresses, and mobile numbers also, participants' responses were kept confidential, with data stored securely for research purposes only.

3.9.3. Data Protection

Best practices in recent studies on measures to protect data integrity and security were adhered to (Xu et al., 2021). Stringent data protection protocols, for example, encryption, which ensures that data remains unreadable without the proper decryption keys, were implemented to safeguard against unauthorized access or disclosure.

3.10. Chapter summary

This chapter has outlined the paradigm, strategy, design, and methodology of this study; it adopted a pragmatism paradigm, aligning with a mixed-methods approach to investigate factors affecting the adoption of the NaTIS in the City of Tshwane. In the chapter was discussed - the target population, sampling techniques (simple random and convenience), sample size, data collection methods, questionnaire distribution

and how ethical considerations were observed. The chapter underscored the use of Cronbach's alpha for assessing measurement reliability and introduced EFA for examining underlying constructs within the dataset. This chapter, thereby, provided a comprehensive framework for the research process.

CHAPTER 4:

PRESENTATION AND DISCUSSION OF FINDINGS

4.1 Introduction

The previous chapter outlined the research methods and techniques used to collect the data for this study. This chapter focuses on the analysing, presenting, and interpreting of the findings based on the data collected from the survey instrument.

Quantitative data was analysed using SPSS version 28, and the qualitative data underwent thematic analysis. In addition, regression analysis were used to test the hypothesis.

The results of this chapter are grouped and presented in six sections. Section A consists of Part A – Descriptive Statistical Results and Part B – the demographic Information Results. Section B presents the results of reliability analysis and construct validity; Section C presents the results of e-government and NaTIS usage; Section D presents the results from the NaTIS users; Section E presents the results of the non-NaTIS users, while Section F presents the correlation and regression analyses results.

4.2. Section A: Survey Results and Demographic Information

4.2.1. Part A: Descriptive Statistical Results

A total of 400 questionnaires were distributed within Thulamela and Makhado municipalities. The questionnaires consisted of closed and open-ended questions in line with the theoretical framework's constructs of the study. To cater for citizens who preferred to complete the questionnaire online and those who preferred to fill in hard copies, and considering the sampling techniques used, the questionnaires were distributed in two ways. Two hundred questionnaires were self-administered, and 200 were distributed electronically. Electronic questionnaires were distributed based on the participants' preferred methods, whether Email or WhatsApp, depending on what devices the participants had access to.

4.2.1.1. Response Quality

In accordance with previous research by Rada and Domínguez-Álvarez et al., (2014), the effectiveness and accuracy of self-administered and computer-based

questionnaires in capturing participant responses accurately, is dependent on method of the distribution of the questionnaires. As outlined in Table 4.1, out of the initial distribution of 200 self-administered questionnaires, a substantial 66.5% (133/200) were returned by participants. Among the returned questionnaires, 57.5% (115/200) were completed comprehensively, showcasing participants' dedication to providing thorough responses, however, around 9% (18/200) of the questionnaires contained missing data and were consequently excluded from the analysis to maintain data integrity.

Additionally, 33.5% (67/200) of the self-administered questionnaires were not retrieved, indicating a degree of non-response within this distribution mode. Turning to the computer-based questionnaires, the participants completed 88% (176/200), while 12% (24/200) remained incomplete. In summary, approximately 60.48% of the completed questionnaires were collected through computer-based methods, with the remaining 39.52% retrieved as hard copies. Overall, adhering to the methodology of Rada and Domínguez-Álvarez (2014), 72.75% (291/400) of questionnaires were considered suitable and included in the subsequent data analysis. This guaranteed the reliability of the dataset and reinforced the strength of the findings.

Table 4. 1. Citizens' response rate

Citizens' response rate

	Targeted Respondents	Actual Respondents	Valid	Valid Percent
Self-Administered	200	133	115	39.52
Computer (Electronical)	200	176	176	60.48
Total	400	309	291	100.00

4.2.2. Part B: Demographic Information

This section provides background information about the participants, including gender, age group, education level, and computer literacy skills. The significance of considering these factors in a study on technology acceptance and adoption is underlined by Kitsiou et al., (2022), who highlight the link between socio-demographic attributes and technology acceptance.

Notably, technology design and functionality preferences can vary between genders, while different age groups may prioritize distinct features. Additionally, education and computer literacy skills play a role in individuals' comfort and effectiveness in using technology (Kitsiou, 2022). For instance, those with higher computer literacy skills tend to use technology more adeptly due to their familiarity with such devices.

Table 4.2 showcases the respondents' demographics. Among the 291 who completed questionnaires, 59.11% were males and 40.89% were females, indicating male predominance. Based on age distribution as presented in Table 4.2, most respondents (38.83%) fall within the 17-26 age group, possibly because the NaTIS was declared the main mode for accessing NaTIS services during the COVID-19 pandemic and because most citizens take their driving licenses between that age. Furthermore, 26.12% were between the ages of 27 – 36 years; 23.37% were between the ages of 37 – 46; 11% were between the ages of 47 - 56, and 0.01% were aged 57 and above.

Respondents were also asked about their highest educational level. Figure 4.1 shows that 32.65% of respondents held bachelor's degrees; 30.24% possessed matric certificates; 29.21%, had attained diplomas, with 6.87% possessing post-graduate degrees. A marginal 0.68% endorsed other educational categories, encompassing one respondent each for "no qualification" and "advanced diploma".

Respondents were asked to rate their skills in relation to their computer literacy proficiency. The dominant level of computer literacy, as illustrated in Table 4.2, was level 3 (average), composing 36.77% of respondents; followed closely by level 5 (excellent) at 32.99%; a smaller proportion, 25.77%, endorsed level 4 (good), and 4.47% attested to a skill level of 2 (low). Notably, no respondent indicated possessing very low skills (level 1).

Detailed breakdowns by age group reveal vital trends. In the 17 - 26 age group, more females (81) than males (32) participated; in the 27-36 group, females showed higher computer literacy (72%, excellent) with bachelor's degrees, while males (90%, average to good) held bachelor's and diplomas. Similar patterns were observed in the 37- 46 group; within the 47- 56 group, females (72%, excellent) hold bachelor's

degrees, while males (40%, average to good) held diplomas and bachelor's degrees. Participants aged 57 and above were limited but showed varying levels of computer literacy. This comprehensive exploration of respondents' demographics and computer literacy skills provides valuable insights into the potential for NaTIS acceptance across diverse groups.

Table 4. 2. Demographic Information

Measure	Items	Frequency	Percentage
Gender	Male	172	59.11%
	Female	119	40.89%
Age group	17 - 26	113	38.83%
	27 - 36	76	26.12%
	37 - 46	68	23.37%
	47 - 56	32	11.00%
	57 and above	2	0.01%
Education Level	Matric	89	30.24%
	Diploma	85	29.21%
	Bachelor's Degree	95	32.65%
	Post-graduate	20	6.87%
	Other	2	0.68%
Computer Literacy Skills	Level	(Where: 1 = very low; 2 = low; 3 = average; 4 = good; 5 = excellent)	
		1	0	0.00%
		2	13	4.47%
		3	107	36.77%
		4	75	25.77%
		5	96	32.99%

4.3. Section B: Reliability Analysis and Construct Validity

4.3.1. Reliability Analysis

Cronbach's Alpha was used to test the reliability of the constructs of the scale or the questionnaire. Guidelines by George and Mallery (2003) offer a framework for interpreting Cronbach's alpha coefficients, suggesting that coefficients above certain thresholds indicate varying levels of reliability. Specifically, "*α > .9 – Excellent, α > .8 – Good, α > .7 – Acceptable, α> .6 – Questionable, α > .5 – Poor, and α < .5 – Unacceptable*" (George & Mallery, 2003, p. 231).

In the current study, 30 items under seven constructs underwent reliability testing. As illustrated in Table 4.3, the analysis revealed that the performance expectancy factor comprised three items with a Cronbach's Alpha value of 0.812, indicative of good internal consistency. Similarly, the effort expectancy factor included four items, yielding a Cronbach's Alpha value of 0.837, indicating good internal consistency. The facilitating conditions factor, comprising six items, demonstrated a Cronbach's Alpha value of 0.856, signifying good internal consistency. Furthermore, the perceived relatedness factor had five items, yielding a Cronbach's Alpha value of 0.840, confirming good internal consistency.

The actual usage & continuous use factor, containing three items, showed a Cronbach's Alpha value of 0.718, suggesting acceptable internal consistency. The social influence factor, representing four items, demonstrated a high Cronbach's Alpha value of 0.904, indicating excellent internal consistency. Lastly, the behavioural intention factor, comprising five items, yielded a Cronbach's Alpha value of 0.818, signifying good internal consistency in its measurement.

Table 4. 3. Reliability Statistics

Reliability Statistics		
Factor	Cronbach's Alpha	N of Items
Performance Expectancy	0.812	3
Effort Expectancy	0.837	4
Facilitating Conditions	0.856	6
Perceived Relatedness	0.840	5
Actual Usage & Continuous use	0.718	3
Social Influence	0.904	4
Behavioural Intention	0.818	5

4.3.2. Construct Validity

According to Sürücü and Maslakçi (2020), construct validity refers to the degree to which the instrument measures the concept, behaviour, idea, or quality that is to be measured. Construct validity was evaluated using the KMO and Bartlett sphericity test and correlation matrix.

KMO (Kaiser-Meyer-Olkin) and Bartlett's tests are used to evaluate the adequacy of the correlation matrix for factor analysis (Sürücü and Maslakçi, 2020). The KMO test checks sampling adequacy, while Bartlett's test assesses the overall relationship between variables. KMO is conducted to evaluate the strength of data intercorrelation between variables. The KMO ranges from 0 to 1, where values closer to 0 indicate low intercorrelation among variables and unsuitability for factor analysis. Values closer to 1, however, indicate higher intercorrelation among variables and that the data is perfectly suited for factor analysis; a KMO value of 0.5 or above is considered acceptable.

The Bartlett's test checks the relationship among variables by checking the null hypothesis that the correlation matrix of the observed variables is an identity matrix, which would indicate no relationship between variables. A significant statistical test (less than 0.05) indicates that the null hypothesis should be rejected, and factor analysis may be appropriate.

4.3.2.1. KMO and Bartlett's Tests for NaTIS users

Table 4.4 displays a KMO test value of 0.911, signifying a substantial correlation among the variables within the dataset. The accompanying p-value of 0.000 also provides strong evidence for rejecting the null hypothesis. This shows that the variables in the dataset do not blend with the assumption of no correlation, thus, they are significantly correlated, substantiating the feasibility of conducting factor analysis.

Table 4. 4. KMO and Bartlett`s Test for NaTIS users

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.911
Bartlett's Test of Sphericity	Approx. Chi-Square	2134.110

	df	210
	Sig.	.000

The Exploratory Factor Analysis (EFA) was conducted on 21 items based on the nature of the data and research objectives. As indicated in Table 4.5, each of the five extracted factors possessed eigenvalues exceeding 1. In addition, the cumulative proportion of variance reached 50% with the initial two factors, collectively explaining approximately 55% of the overall variance within the dataset, however, all factors were retained for further analysis.

Table 4. 5. Total Variance for (NaTIS users)

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	9.815	46.736	46.736	9.815	46.736	46.736	8.054
2	1.643	7.825	54.561	1.643	7.825	54.561	4.624
3	1.426	6.793	61.353	1.426	6.793	61.353	6.856
4	.961	4.577	65.930				
5	.828	3.942	69.873				
6	.679	3.234	73.107				
7	.649	3.090	76.196				
8	.611	2.912	79.108				
9	.533	2.537	81.645				
10	.522	2.486	84.131				
11	.459	2.188	86.319				
12	.436	2.079	88.397				
13	.391	1.862	90.259				
14	.370	1.764	92.023				
15	.340	1.619	93.642				
16	.304	1.449	95.091				
17	.274	1.306	96.396				
18	.225	1.073	97.469				
19	.210	.998	98.467				
20	.166	.790	99.257				
21	.156	.743	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

4.3.2.2. KMO and Bartlett's Tests for Non-NaTIS users

Figure 4.6 shows a KMO test value of 0.841, indicating that the data has a relatively high degree of intercorrelation among the variables, therefore, the data is suitable for factor analysis. Furthermore, the p-value (<0.001) is strong evidence to reject the null

hypothesis. This shows that the variables in the dataset do not blend with the assumption of 'no correlation', thus, they are significantly correlated and further support their suitability for factor analysis.

Table 4. 6. KMO and Bartlett's Tests for Non-NaTIS users

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.841
Bartlett's Test of Sphericity	Approx. Chi-Square	686.183
	df	36
	Sig.	<.001

EFA was also conducted on 9 items based on the nature of the data and research objectives. Table 4.7 shows that the cumulative proportion of variance exceeded 50% with the first factor. However, all factors were retained for further analysis.

Table 4. 7. Total Variance for (non-NaTIS users)

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	4.932	54.799	54.799	4.932	54.799	54.799	4.505
2	1.323	14.701	69.500	1.323	14.701	69.500	3.180
3	.747	8.304	77.804				
4	.631	7.008	84.812				
5	.446	4.952	89.764				
6	.337	3.743	93.507				
7	.238	2.647	96.154				
8	.209	2.318	98.471				
9	.138	1.529	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

4.4. Section C: E-Government and NaTIS usage

Regarding citizens' awareness and experience with using e-government, three questions were asked: citizens' familiarity with the e-government concept, awareness of its benefits, and years of experience using e-government applications. The researcher also sought to establish the respondents' NaTIS usage extent or frequency and their years of experience using it. As a result, two questions were asked: NaTIS usage frequency and the years of experience using it.

4.4.1. Awareness of the e-government concept

Figure 4.1 illustrates that 91% of the participants demonstrated familiarity with the concept of e-government. Most of these respondents showed computer literacy skills ranging from average to excellent. In contrast, 9% of the participants indicated a lack of awareness regarding e-government, however, within this subset, most still possessed good computer literacy skills. This observation, therefore, highlights a widespread awareness of the e-government concept among citizens. Furthermore, it highlights proficiency in computer skills, potentially contributing to their favourable attitude towards NaTIS acceptance and utilization.

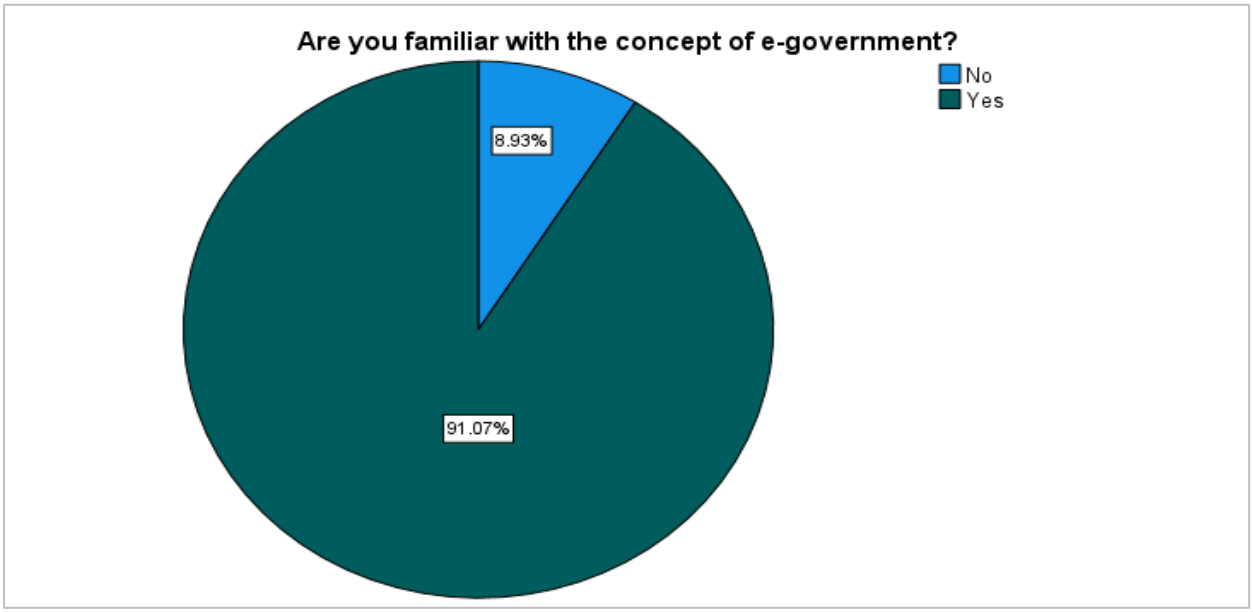

Figure 4. 1. E-government concept

4.4.2. Awareness of the benefits of e-government

Those participants who expressed their familiarity with the e-government concept were then asked about their awareness of its associated benefits. A few examples were provided to them to ensure consistency of their responses. As presented in Figure 4.2, approximately 88% of the respondents indicated a recognition of e-government benefits, although, about 12% of the respondents indicated that they are unaware of the benefits of e-government. Most respondents who completed this question had, average to excellent, computer literacy skills. This includes citizens that need to be made aware of the e-government benefits.

Based on these findings, although some citizens are aware of the e-government concept but not aware of its benefits, they have adequate computer literacy skills that could assist them with accepting and using the NaTIS.

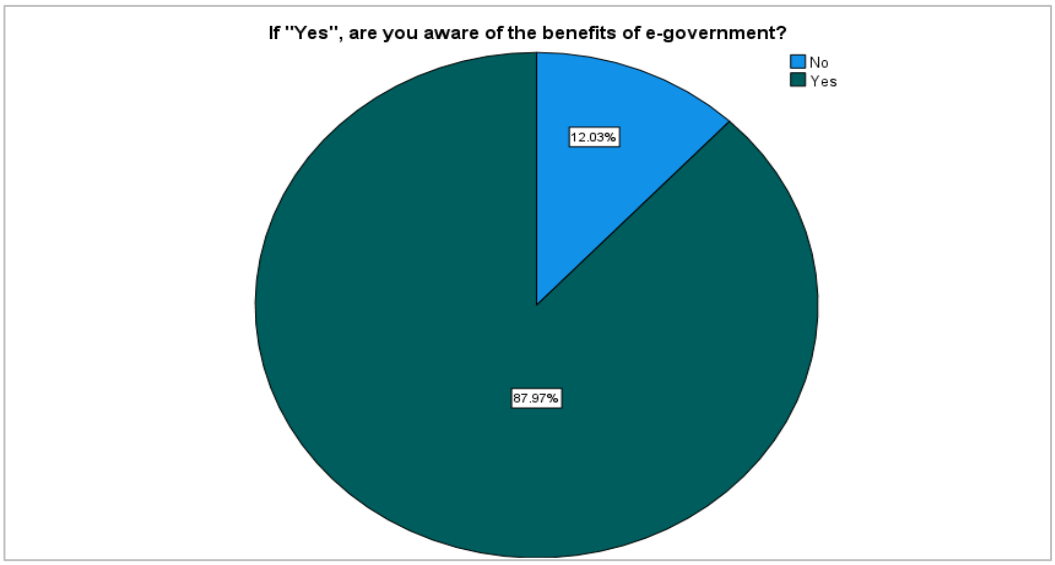

Figure 4. 2. E-government benefits awareness

4.4.3. Use of e-government applications/services

The participants were also asked to indicate their years of using or consuming e-government services; based on Figure 4.3, close to 40% of the respondents indicated no experience using e-government systems; meaning that they have never used it. Approximately 9% of the respondents indicated that they have been using the government systems for a minimum of 5 years, about 33% of the respondents indicated that they have been using the e-government for a period of between 2 – 5

years, and about 18% of the respondents have only used the e-government systems for between 0 and 2 years.

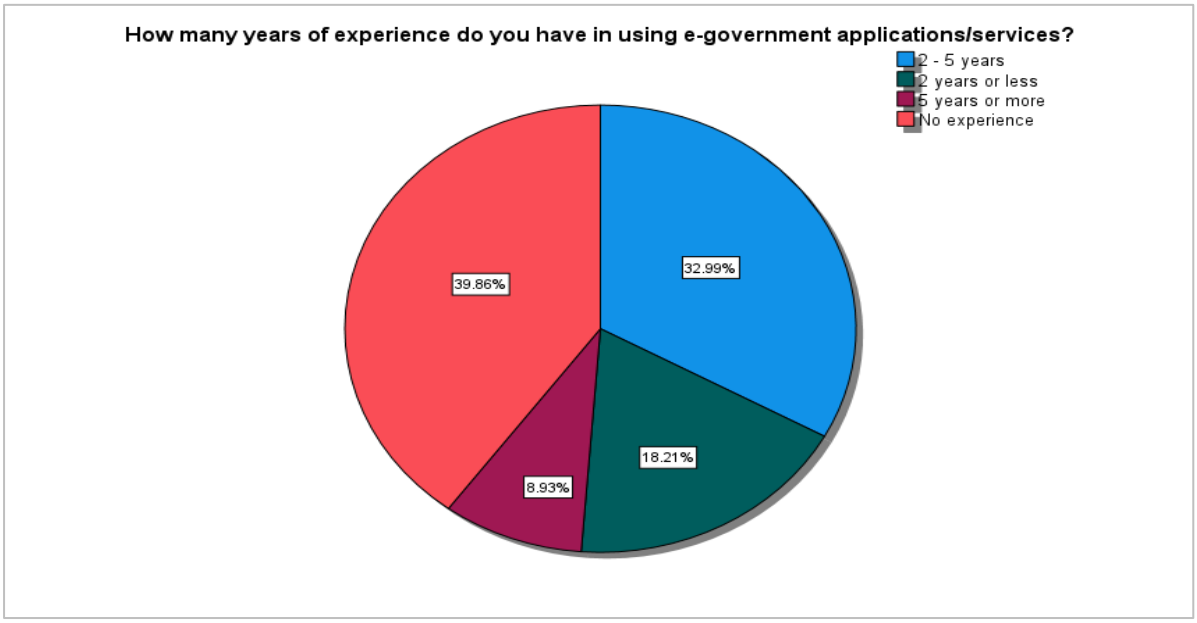

Figure 4. 3. Use of e-government applications/services

Table 4.3 illustrates that about 75% of the respondents with no hands-on experience using e-government systems were females, whereas only 25% were males. This could mean that males explore more, hence, are exposed to technologies, however, it is noteworthy that both genders, specifically 95% of the females and 100% of the males, indicated that they have average to excellent computer literacy skills. This shows that they may be able to use the NaTIS, if proper instructions, assistance and motivation are provided.

Table 4. 8. E-government application use vs computer literacy skills vs gender

Experience Level	Computer Literacy Skills *(Where: 1 = very low; 2 = low; 3 = average ; 4 = good; 5 = excellent)*	Gender		Grand Total
		Female	Male	
No Experience	1	0	0	**0**
	2	4	0	**4**
	3	13	2	**15**
	4	23	3	**26**

	5	47	24	**71**
Grand Total		**87**	**29**	**116**

4.4.4. The use of the NaTIS

A significant majority of respondents, approximately 43%, reported never utilizing the NaTIS website. In contrast, nearly 38% indicated engaging with the NaTIS services, monthly. Moreover, 11% of respondents confirmed a weekly- usage pattern, while only 1% reported daily usage of the NaTIS. Around 7% of respondents indicated infrequent utilization of the NaTIS for accessing DLTC services.

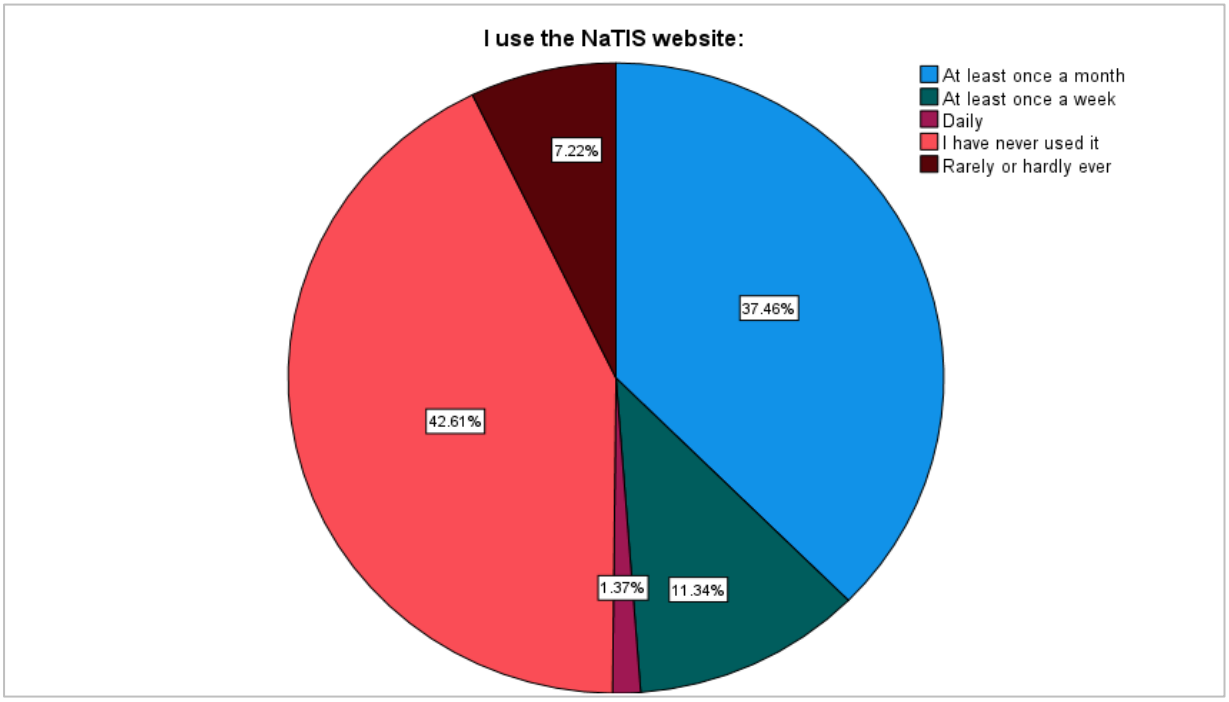

Figure 4. 4. NaTIS Usage

Table 4.4 illustrates the relationship between the respondents who had never used the NaTIS, their computer literacy skills, and their education level. The results depicted that regardless of the educational level, the majority of the respondents have good to excellent computer literacy skills. This shows that even though a visible proportion of citizens are not using the NaTIS, they have sufficient computer literacy skills, which could boost their confidence in adopting technology, hence, accepting, and using the NaTIS.

Table 4. 9. NaTIS Usage vs Education Level and Computer literacy skills

NaTIS usage frequency	Computer Literacy Skills		Highest Qualification Level					Grand Total
			None	Matric	Diploma	Bachelors	Post-graduate	
I have never used it	very low	1	0	0	0	0	0	**0**
	low	2	1	4				**5**
	average	3		10	3	1	1	**15**
	good	4		20	2	4	1	**27**
	excellent	5		51	9	12	5	**77**
Grand Total			**1**	**85**	**14**	**17**	**7**	**124 / 291**

4.4.5. NaTIS usage experience

Respondents using the NaTIS were also asked to select the years they used it. To ensure the validity of this question, 124 respondents who indicated that they had never used the NaTIS were excluded from this question, therefore, only 167 respondents were considered. Based on Figure 4.5, most respondents have been using the system for between 1 and 5 years, contributing to the 81% of all the NaTIS users; 16% of the respondents indicated that they have been using the NaTIS for less than a year, and only 3% have used the NaTIS for over five years. Based on the above results, citizens who have been using the system for between 1 and 5 years could have done so after COVID-19 hit SA and due to DLTC restrictions on walk-ins and clear instructions on how to use the NaTIS website.

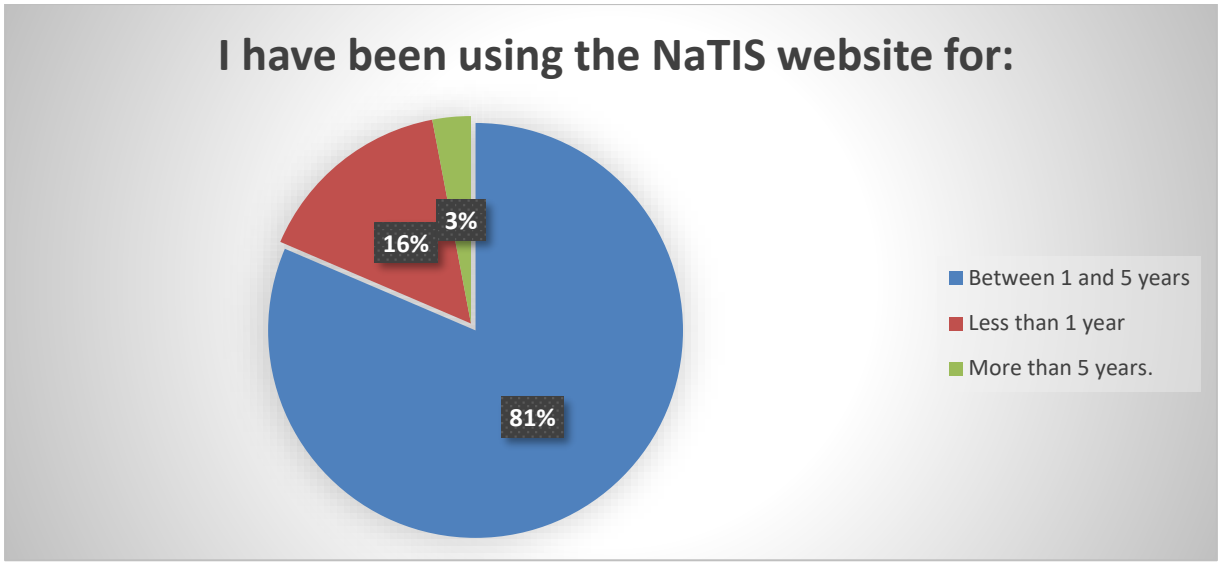

Figure 4. 5. NaTIS Usage Experience

4.5. Section C: NaTIS Users

This section aims to comprehensively understand NaTIS website usage among citizens, including their awareness of its benefits and the challenges encountered during access. The analysis is structured around key constructs, including Performance Expectancy, Effort Expectancy, Facilitating Conditions, Perceived Relatedness, Perceived Privacy, and Actual Usage and Continuous Usage of the NaTIS.

4.5.1. Performance Expectancy

Venkatesh et al., (2003) defines *performance expectancy* as the degree to which people believe that engaging technology would help them improve their work performance. A total of three statements were included in this factor, as shown in Table 4.5. Analysis revealed high consensus among participants regarding the NaTIS's effectiveness.

Table 4. 10. Performance Expectancy Statements

Performance Expectancy				
		I visit the NaTIS website whenever I need specific information or to access national traffic services.	Using the NaTIS website saves my time and cost.	The NaTIS website allows me to use it anywhere.
N	Valid	167	167	167
	Missing	124	124	124
Median		4.00	4.00	4.00
Mode		4	4	4

4.5.1.1. NaTIS accessibility

NaTIS accessibility evaluates whether participants believe that the NaTIS website enables them to use it conveniently, from any location based on perceived performance. As depicted in Figure 4.6, approximately 83% of the respondents agreed (46%) or strongly agreed (37%) that the NaTIS enables convenient usage from any location. This strong agreement emphasises that most respondents consider the NaTIS website effective in ensuring access to information, irrespective of their physical whereabouts. Contrarily, 13% of respondents expressed uncertainty regarding the NaTIS's convenience, suggesting a need for further clarification or potential improvements regarding its features and accessibility. Furthermore, a few respondents (4%) disagreed with the statement, indicating minor concerns or challenges in utilizing the NaTIS website, conveniently, from different locations.

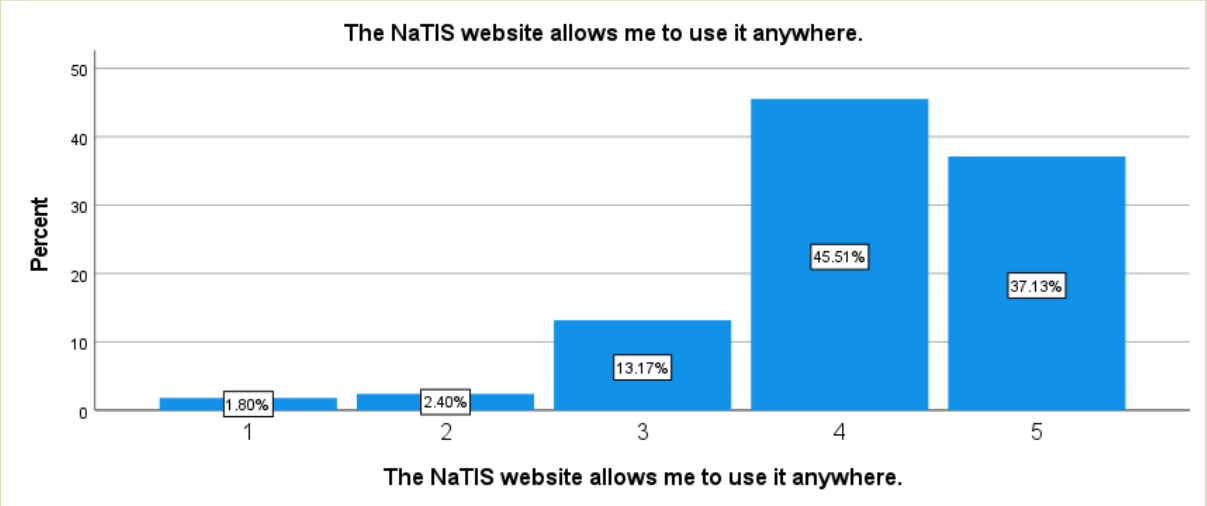

Figure 4. 6. NaTIS website accessibility

The analysis showed that most respondents found NaTIS accessible from any location, emphasizing its effectiveness in providing access to information. However, a

minority expressed uncertainty or disagreement, suggesting potential areas for clarification or improvement in accessibility features.

4.5.1.2. Visiting the NaTIS for information and services

The section on "Visiting the NaTIS for Information and Services" sought to evaluate participants' tendencies to access the NaTIS website when seeking specific information or services related to national traffic services. As depicted in Figure 4.7, approximately 65% of the respondents confirmed that they visit the NaTIS website whenever they require specific information or service related to the national traffic services. This shows that most citizens actively use the NaTIS website for information and services, suggesting high acceptance and reliance on the NaTIS system for fulfilling their traffic-related needs, however, close to 7% of the respondents disagreed with the statement. This could be because they have alternative sources of information, or they have been facing challenges while using the NaTIS website. Moreover, 29% of the respondents are unsure about their frequency of visiting the NaTIS website for information and services; this suggests a need to encourage them to consume the NaTIS services as they offer numerous benefits.

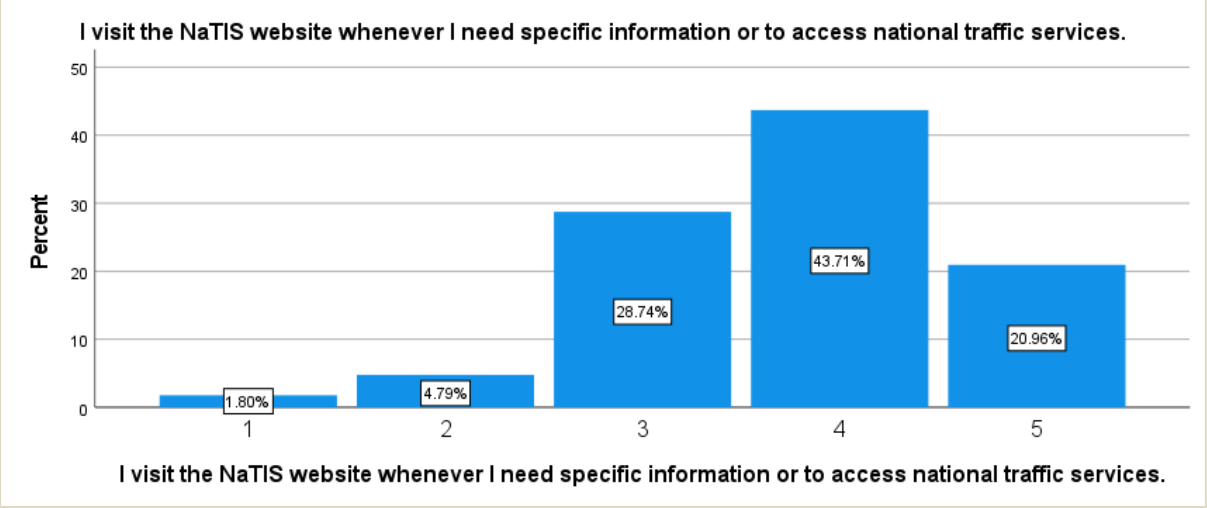

Figure 4. 7. NaTIS Information and Services

Drawing upon Figure 4.7, most respondents reported actively using NaTIS for information and services related to national traffic services, indicating a high level of

acceptance and reliance on the system. However, some expressed uncertainty or disagreement, possibly due to alternative sources of information or usability issues.

4.5.1.3. NaTIS services consumption to save travelling time and costs

The statement - "NaTIS services consumption to save travelling time and costs" assesses whether participants believe the NaTIS service consumption can save them time and costs. Figure 4.8 shows that 53% of the respondents agree that the NaTIS is time and cost-saving, and 16% strongly agree with the above statement. This shows that more than 69% of the citizens are positive about using the NaTIS services, since it was beneficial for them in terms of saving time spent on walk-ins and costs. This indicates a high acceptance and the perception of the NaTIS system as an effective tool for optimizing resource utilization. Furthermore, 25% of the respondents are uncertain about the statement, which could have stemmed from a lack of awareness or a need for further information regarding the benefits of using the NaTIS. About 6% of the respondents disagreed with the statement, possibly due to alternative methods or services they rely on for national traffic-related services or potential challenges they faced while using the NaTIS.

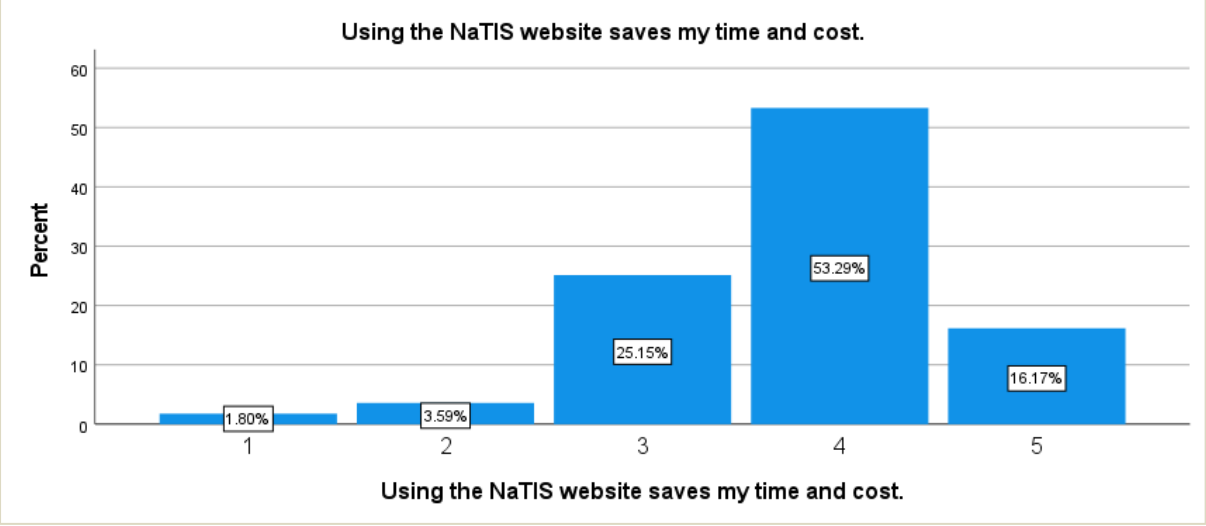

Figure 4. 8. NaTIS Consumption to save Time and Cost

Based on Figure 4.8, most respondents perceived NaTIS as time and cost-saving, indicating its perceived value in optimizing resource utilization. However, a significant portion expressed uncertainty or disagreement, suggesting a need for further awareness or clarification regarding the benefits of using NaTIS.

4.5.1.4. Respondents' comments regarding Performance Expectancy

Based on the analysis of respondents' feedback concerning Performance Expectancy, the following themes have been identified towards the acceptance and use of the NaTIS:

- Speed and Reliability: The respondents acknowledge the speed and reliability of the NaTIS system as shown by various comments, including *"NaTIS is fast and reliable".* (Participant 2), and *"The performance of the website and its functions have definitely improved."* (Participant 7). Overall, these characteristics contribute to its acceptance and encourage its continuous use by citizens.

- User-Friendliness and Convenience: Respondents find the NaTIS system user-friendly, useful, and convenient. They appreciate its ease of use and mention that it has been helpful in their respective driving schools, allowing learners to book slots efficiently. This is also supported by the statement: *"The new upgraded version looks fine "* (Participant 2), suggesting that users find it easy to navigate and interact with the system, enhancing its acceptance and encouraging its continuous use.

- Positive Feedback and Recommendations: Most respondents provided positive feedback, describing the NaTIS as a good system, and praising the improvements made in the upgraded version. For instance, driving schools owners also mentioned encouraging their learners to use the NaTIS for making appointments due to its ease and efficiency. The statements *"The NaTIS has been helping my Driving School learners to book slots"* (Participant 9) and *"Since I started working for XX-P Driving School, we have been encouraging our learners to make their appointments online via the NaTIS."* (Participant 13). These comments shows that the NaTIS assists users, especially driving school learners, in booking slots for various services. This feature is valued and contributes to the widespread acceptance and continuous use of the NaTIS.

- Limitations and Issues: A small group of respondents articulated their concerns regarding certain limitations of the NaTIS. They mentioned the inability to immediately amend or cancel confirmed bookings and the need to send an email

to the administration, which can take up to five days, as supported by the following comment:

> *"Very limiting as confirmed booking cannot be amended or cancelled immediately. A mail must be sent to administration, which takes 5 days. You cannot book anything else for the same service if you currently have a booking active."* (Participant 5).

This causes frustration to NaTIS users since they cannot make immediate changes to their bookings and must rely on administrative processes, which take time. This regulation negatively affects the widespread acceptance and use of the NaTIS.

Themes identified from respondents' feedback highlighted the system's speed, reliability, user-friendliness, and positive recommendations. However, limitations such as the inability to immediately amend bookings were noted, indicating areas for improvement to enhance user experience.

4.5.2. Effort expectancy

The UTAUT Model defines effort expectancy as the extent of ease associated with the utilization of technology (Venkatesh et al., 2003). This section presents the respondents' attitudes towards the effort expectancy of the NaTIS. Table 4.11 presents four statements representing this factor. Notably, a prevalent trend is observed, with a prominent median and mode value of 4 (agree) across the statements, depicting a high level of agreement among the participants and that the statement accurately reflects their perceptions or opinions.

Table 4. 11. Effort Expectancy

Effort Expectancy					
		Becoming skillful at using the NaTIS website is easy for me.	The content on the NaTIS website is clear and understandable.	Interaction with the NaTIS website is easy for me to use.	Overall, I am satisfied with how the NaTIS website is easy to use and navigate to services.
N	Valid	167	167	167	167
	Missing	124	124	124	124
Median		4.00	4.00	4.00	4.00
Mode		4	4	4	4

4.5.2.1. NaTIS content clarity

NaTIS content clarity evaluates participants' beliefs on whether the NaTIS website content is clear and understandable. This statement aimed to determine how much effort citizens need to adequately read and understand what is written and required from them on the NaTIS website, while acquiring services. Figure 4.9 shows that 47% and close to 30% of the respondents were positive that the NaTIS is user-friendly, and its content is clear and easy to comprehend, respectively. In comparison, 17% of respondents are uncertain about the statement, possibly due to various aspects or certain sections of the NaTIS that they did not understand, however, a relatively low proportion (about 6%) of the respondents disagreed with the statement, which could be due to various factors, such as the use of complex terminologies, insufficient explanations, or other features, therefore, addressing these concerns could improve the content clarity and comprehensibility of the NaTIS website.

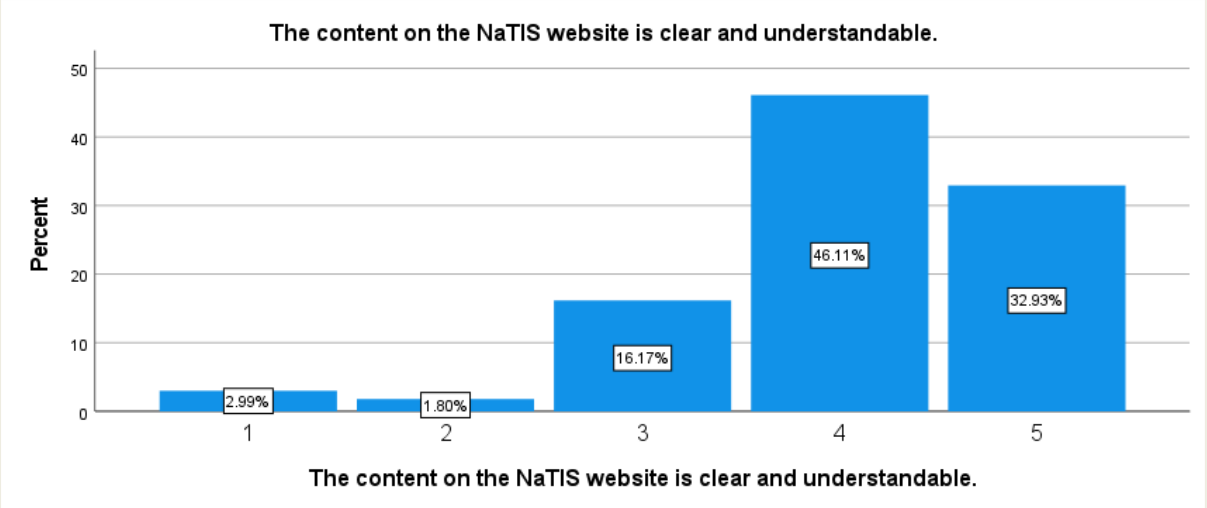

Figure 4. 9. NaTIS website content

4.5.2.2. NaTIS ease of use

The "NaTIS ease of use" assesses participants' perception towards the effort required to become competent and efficiently use the NaTIS website. As illustrated in Figure 4.10, a significant majority of respondents (56%) agreed that the NaTIS is a simple system to master, navigate and use, while 28% of the respondents strongly agreed with this statement. This shows that 84% of respondents perceive the effort required to become skilled in using the NaTIS website as reasonable and manageable. In contrast, a small proportion (approximately 10%) of the respondents are uncertain about this statement. This could indicate that some citizens may have a lack of clarity

or reservations regarding specific requirements involved; 6% of the respondents disagreed with the statement. This indicates that the NaTIS is a challenging system for them.

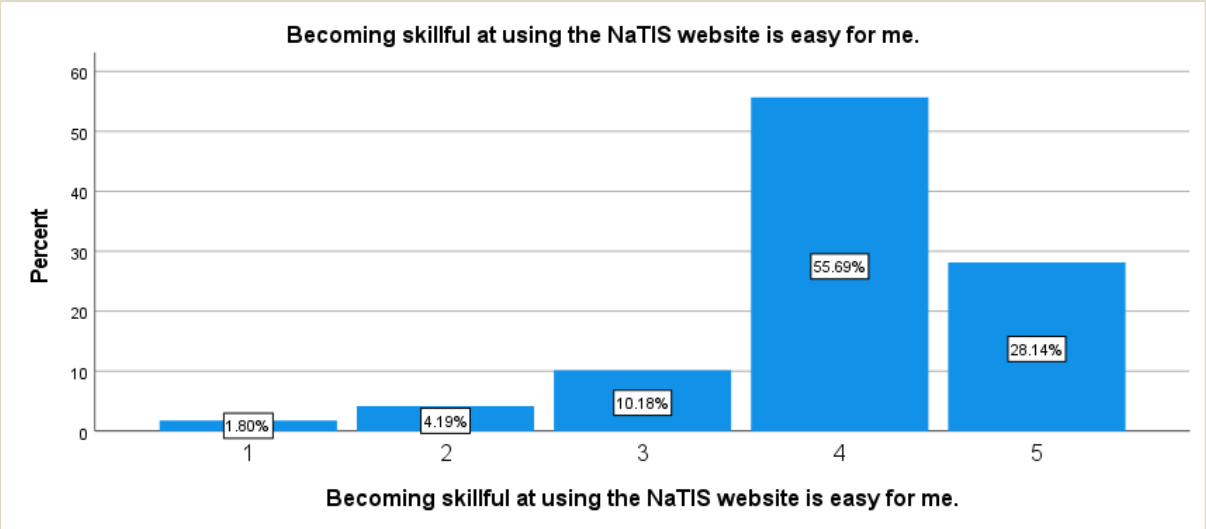

Figure 4. 10. NaTIS ease of use

The insights derived from Figure 4.10 emphasize that most respondents perceived NaTIS as easy to master and use, indicating a reasonable level of effort required for proficiency. However, some expressed uncertainty or disagreement, highlighting challenges in mastering the system.

4.5.2.3. Interaction with NaTIS

It was necessary to establish how users felt when interacting with the NaTIS website, therefore, Figure 4.11 shows participants' past experiences regarding interactions with the NaTIS. As illustrated in Figure 4.11, most respondents (approximately 80%) are positive about the point, therefore, their positive experiences with the NaTIS website. It also suggests that a considerable number of citizens are finding the NaTIS website to be satisfactory and effective in facilitating their interactions, conversely, a notable portion (6%) of the respondents disagreed with the statement. This shows that they had had difficulties or negative experiences with the NaTIS, however, about 13% of

the respondents are uncertain about the statement, which potentially indicates room for improvement in terms of user experience.

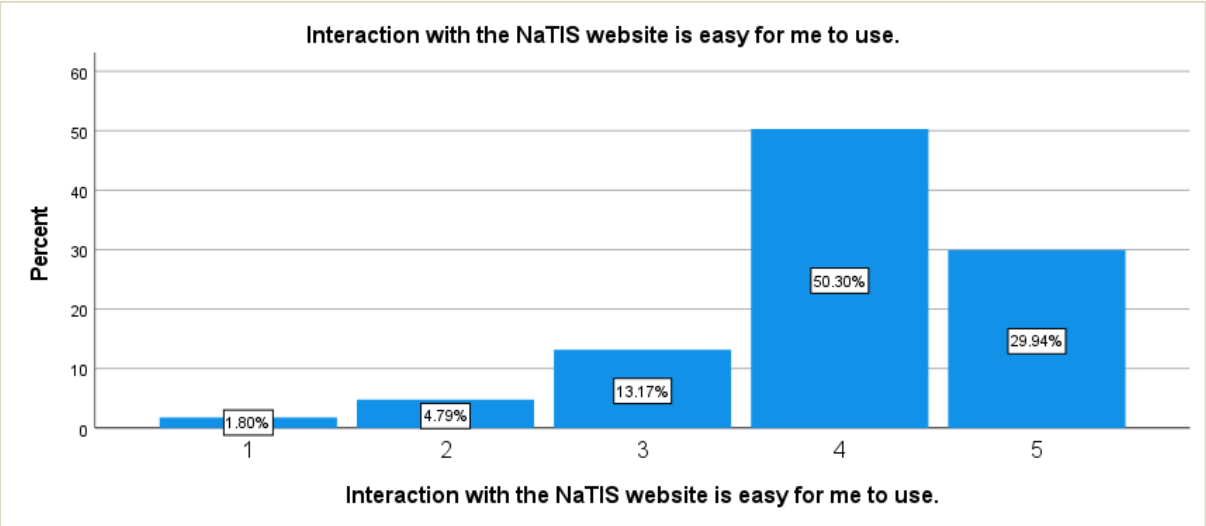

Figure 4. 11. Interaction with the NaTIS

4.5.2.4. NaTIS User Satisfaction

NaTIS User Satisfaction assesses the participants' overall satisfaction levels on whether they view the NaTIS as an easy-to-use and navigate website. The primary objective of this assessment is to establish a correlation and derive substantive conclusions regarding the statements integrated within the effort expectancy factor, as presented in Table 4.11. As depicted in Figure 4.12, nearly 80% of respondents are positive that the NaTIS website is easy to utilize and navigate, although, a small proportion of respondents (20%) were either unsure or disagree, indicating a need to address any concerns or negative experiences expressed by citizens to ensure a

positive and seamless user experience, encourage long-term usage and satisfaction with the NaTIS.

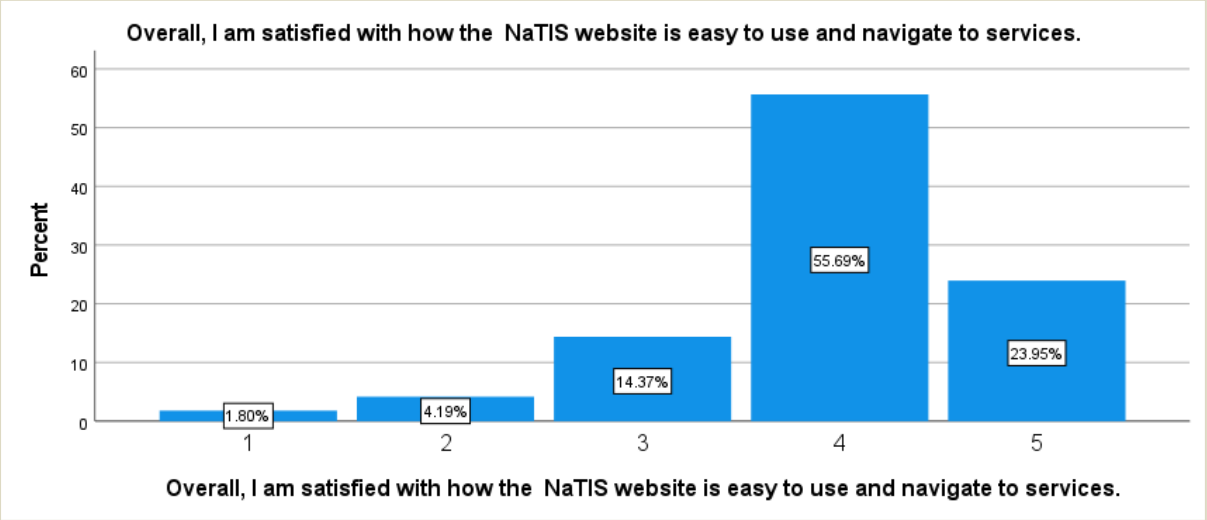

Figure 4. 12. NaTIS User Satisfaction

While most respondents were satisfied with the NaTIS user experience, a minority expressed uncertainty or dissatisfaction, indicating potential areas for improvement in user satisfaction.

4.5.2.5. Citizens' comments regarding Effort Expectancy

Based on the responses provided by the respondents, the following themes were identified regarding effort expectancy towards acceptance and use of the NaTIS:

- Usability: The statement "*The NaTIS has been designed like any other online system. It requires basic skills to use it*" (Participant 1), suggests that NaTIS users are only expected to possess basic computer literacy skills to use the system effectively. Based on this section's previous results, most citizens have these skills.

- Insufficient Error Feedback: Most citizens highlighted a NaTIS system error feedback limitation. Users expressed dissatisfaction with the lack of specific error messages, making identifying and rectifying mistakes difficult. This is supported by the statement, *"When you fill in the details and find that they are incorrect or do not meet the conditions, the system only gives possible general errors, which is bad.*" (Participant 15). As a result, this can negatively impact the acceptance and use of the NaTIS.

- User-Friendly and Ease of Use: The statements *"User friendly"* (Participant 7), *"The website is easy to use"* (Participant 2) and *"It is becoming easier to use the website with their improvements"* (Participant 6) indicate that the NaTIS is generally perceived as user-friendly and easy to navigate. Citizens appreciate its ease of use, positively influencing its acceptance and use.

- Technical Issues: One respondent said, *"I created my account earlier this year, but when I tried to log in, it kept giving me an error. When I tried to reset the password, I got another error 'Internal Server Error Occurred"* (Participant 17). This highlights the technical issues that NaTIS users experience. Such problems, including login and internal server errors, can frustrate users and hinder their acceptance and use of the NaTIS.

- Smooth Functioning and Improvements: The statements *"I visited the website last month to book for a license card renewal, the system never gave me an error, and it was running smoothly"* (Participant 54) and *"It is becoming easier to use the website with their improvements"* (Participant 14) indicate positive experiences with the system's functionality and recent improvements. Users value the smooth running of the system and appreciate the ongoing enhancements, which contribute to their acceptance and use of the NaTIS.

The findings extracted from the exploration of Effort Expectancy themes showed that the acceptance and use of the NaTIS are also influenced by the system's requirement of basic skills, such as computer competence, feedback on errors, user-friendliness, technical issues, and the system's overall functioning. While users generally appreciate the system's ease of use and improvements, limitations in error feedback and technical glitches can impact their acceptance and use. Addressing these issues and ensuring a smooth user experience will likely enhance the acceptance and use of the NaTIS.

4.5.3. Facilitating Conditions

According to Venkatesh et al., (2003), facilitating conditions refer to the extent to which individuals believe that there is an organization's infrastructure (technology, training, funding, availability, and accessibility to technology) which exist to enable the usage of the system. Six statements seeking participants' perceptions were included in this

section as shown in Table 4.12. Based on the values of the mode and median across the statements, it is clear that respondents have positive attitudes towards this factor.

Table 4. 12. Facilitating Conditions Statements

		Facilitating Conditions					
		My internet access at work enables me to use the NaTIS website.	My internet access at home enables me to use the NaTIS website.	My internet access in public places enables me to use the NaTIS website.	My online support enables me to use the NaTIS website to help resolve my query.	My query gets resolved quickly and satisfactorily when I log it on the NaTIS website.	The Frequently Asked Questions (FAQ) site on the NaTIS website helps me easily use the website.
N	Valid	167	167	167	167	167	167
	Missing	124	124	124	124	124	124
Median		4.00	4.00	4.00	4.00	4.00	4.00
Mode		4	5	4	4	4	4

4.5.3.1. Work internet availability to consume NaTIS services

Assessing the availability of internet facilities to interact with the NaTIS involves ascertaining participants' access to unrestricted internet connectivity at their workplaces or homes to enable them to utilize the NaTIS website services. As depicted in Figure 4.13, most respondents (approximately 64%) expressed agreement, while 22% indicated strong agreement. This shows that most citizens believe they have enough internet access in their environment to access the NaTIS website services effectively, however, a small portion of respondents (4%) disagreed with the statement. In addition, 11% of the respondents were uncertain about their level of internet access and its impact on utilizing the NaTIS website services. This uncertainty could be due to various factors, such as workplaces utilizing intranet systems, which restrict internet access to a limited number of approved sites, often exclusively related

to work; although the dissenting perceptions should be considered, they are outweighed by the positive responses from most respondents.

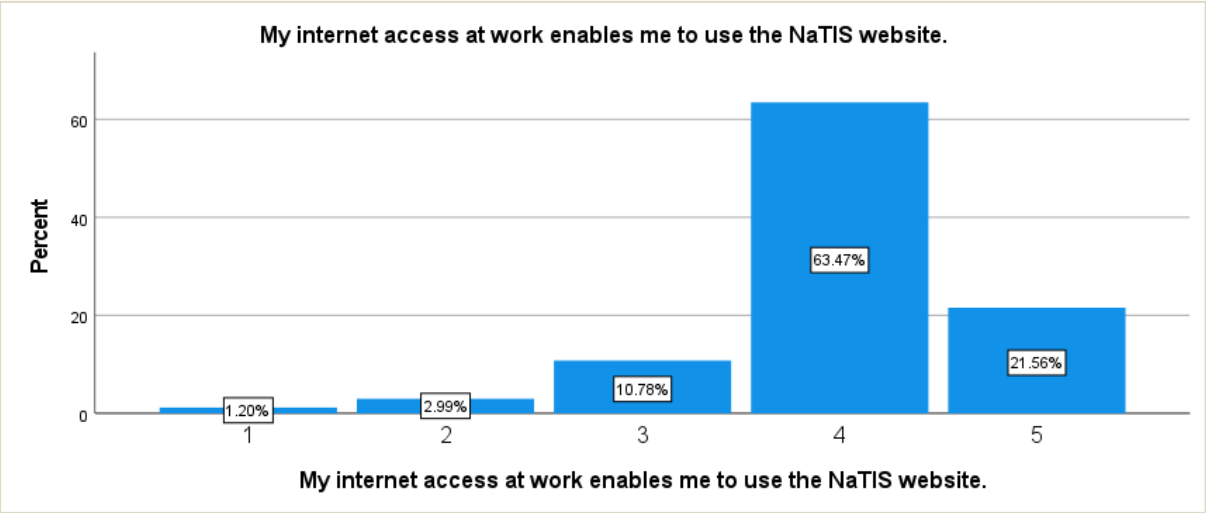

Figure 4. 13.Work internet access to consume NaTIS services

4.5.3.2. Home internet availability to access NaTIS services

Evaluating the availability of home internet to consume the NaTIS involves determining participants' access to adequate internet connectivity at their residences to facilitate the utilization of NaTIS website services. As illustrated in Figure 4.14, a significant portion of respondents (about 85%) believe they have sufficient internet access at their homes to utilize the NaTIS services effectively. Fifteen per cent of the respondents are uncertain; (12%) disagree, suggesting that they perceive limitations or challenges in accessing the NaTIS website due to insufficient internet access at their homes. The

findings in Figure 4.14, however, indicate that the availability of internet access plays a vital role in enabling citizens to engage with and benefit from the NaTIS platform.

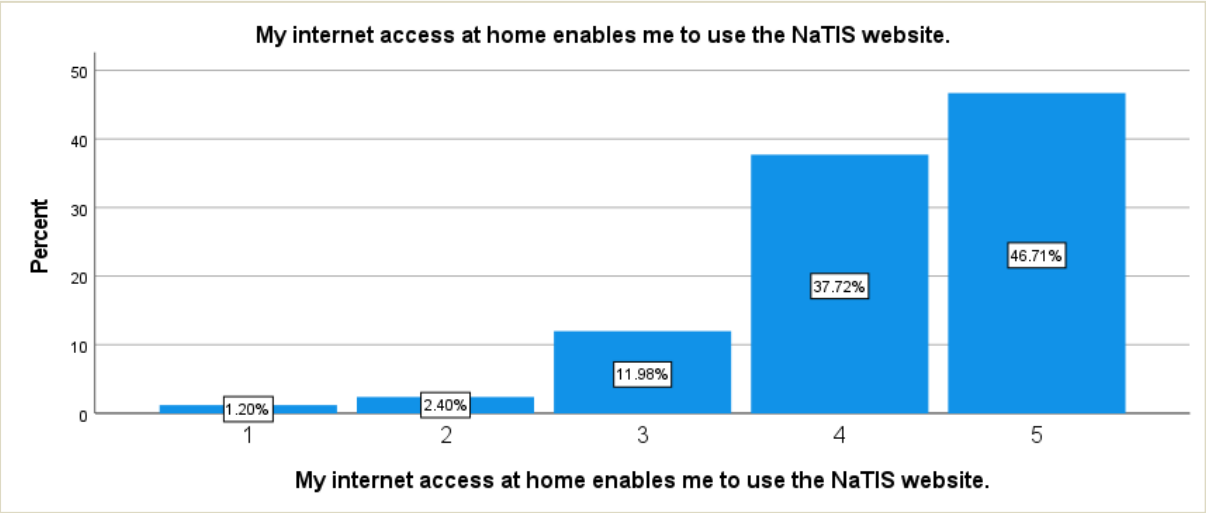

Figure 4. 14. Home internet access to access NaTIS services

4.5.3.3. Public places' internet availability to consume NaTIS services

The assessment of public internet availability for consuming NaTIS services examines participants' access to the internet in public places, facilitating the utilization of the NaTIS website services. As depicted in Figure 4.15, a notable portion (71%) of the respondents assert sufficient internet access in public areas to utilize NaTIS services effectively. Conversely, 24% of the respondents expressed uncertainty, while nearly 5% disagreed, suggesting perceived limitations or challenges in accessing the NaTIS website due to insufficient internet access in public places. The results from Figure 4.15 indicate that most citizens have internet access to utilize the NaTIS services, a positive indicator for acceptance and continuous use. Adequate internet access remains critical for the effective and efficient use of online services, including the

NaTIS, hence, the findings further underscore that internet access plays a vital role in enabling citizens to engage with and benefit from the NaTIS platform.

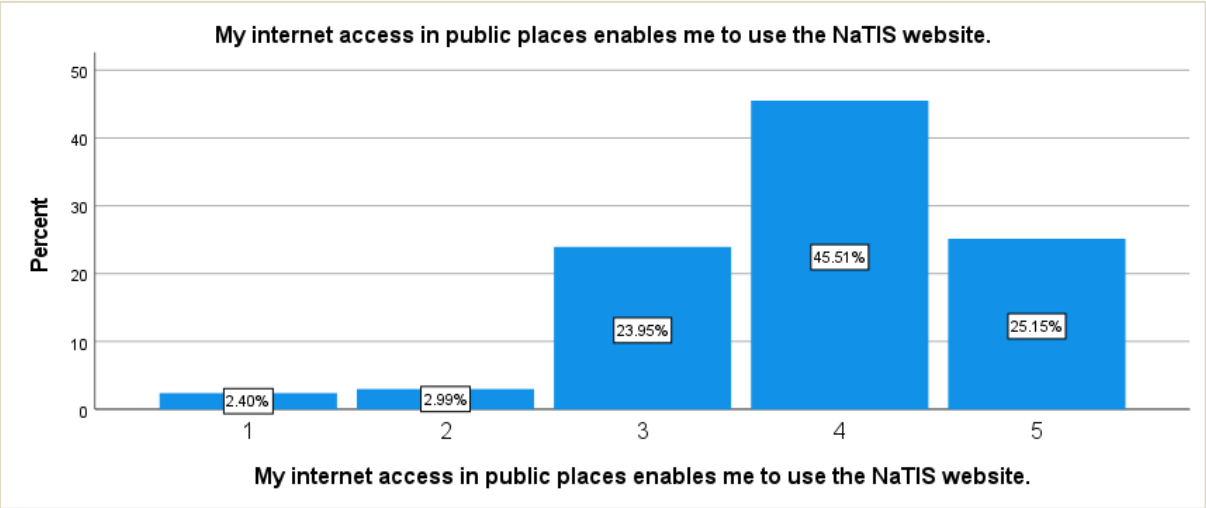

Figure 4. 15. Public places' internet access to use the NaTIS

4.5.3.4. NaTIS Online Support (Query resolving)

The NaTIS Online Support (Query Resolving) component assesses participants' perceptions of the efficacy of online support in utilizing the NaTIS website for query resolution. As depicted in Figure 4.16, approximately 30% of the respondents agreed, while around 36% strongly agreed that the available online support aids them in effectively using the NaTIS website to address their queries. This positive response shows that most citizens perceive online support as a helpful and valuable resource in resolving their concerns or questions related to the NaTIS website; however, 19% of the respondents are uncertain regarding the effectiveness of the online support in using the NaTIS website, which could be due to factors such as limited exposure to or experience with online support resources. Additionally, nearly 7% of the respondents disagreed that the online support enables them to use the NaTIS website effectively for query resolution. This dissenting view could indicate that the NaTIS is not well

equipped with various online support options that could widely assist users with their queries.

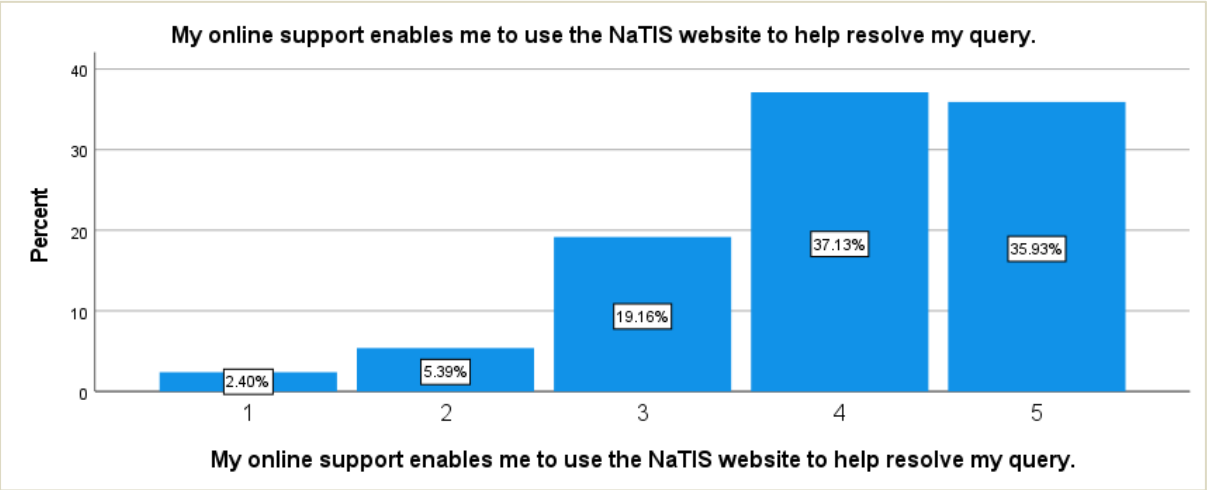

Figure 4. 16. NaTIS Online Support

While most respondents found online support helpful for query resolution, some expressed uncertainty or dissatisfaction, indicating areas for improvement in online support effectiveness.

4.5.3.5. Users' satisfaction with using the NaTIS

Understanding citizen satisfaction with the NaTIS website's response time and the quality of received responses when logging queries are important. Evaluating user satisfaction with the NaTIS involves assessing participants' perceptions concerning the timeliness and satisfaction levels when resolving queries on the NaTIS website. Based on Figure 4.17, about 67% of the respondents are positive that their queries get resolved timelessly and satisfactorily when logged on to the NaTIS website. This favorable perception indicates that most participants perceive the NaTIS website as an effective platform for resolving their queries promptly and satisfactorily, however, 26% of the respondents are uncertain, while about 7% are dissatisfied with the response time and responses they receive when they log queries on the NaTIS website. Figure 4.17 shows that even though most citizens are happy with the way NaTIS solves their queries, they are a few citizens who are still not happy with the responses they receive, which could be due to a lack of clear feedback on the status and outcome of their queries or the reason could be that the NaTIS does not have a

chat agent where citizens could restructure their queries if not happy with their responses.

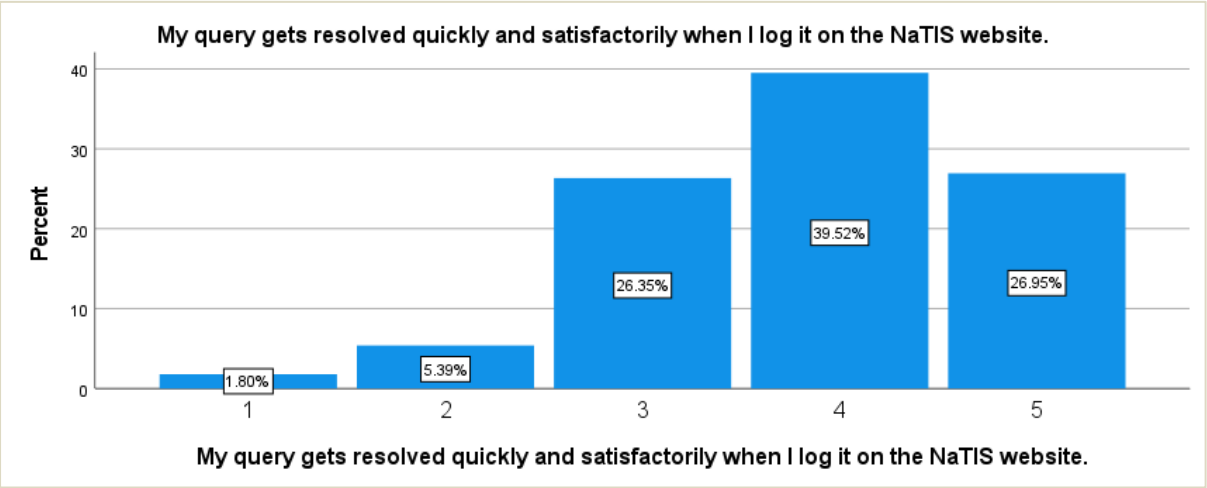

Figure 4. 17. NaTIS user satisfaction

4.5.3.6. NaTIS Frequently Asked Questions (FAQ)

The NaTIS FAQ section explores participants' perceptions regarding the usefulness of the FAQ page in facilitating their usage of the NaTIS website. Based on Figure 4.18, about 70% of the respondents are positive that the FAQ site on the NaTIS website helps them to easily use it. This positive response suggests that most citizens find the FAQ section valuable and effective in providing the necessary information and guidance for navigating and utilizing the NaTIS website. Nearly 22% of the respondents, however, are uncertain about the usefulness of the FAQ site in facilitating their website usage. In comparison, about 7% disagreed that the FAQ site helps them easily use the NaTIS website. This indicates that few citizens do not find the FAQ section effective in assisting them with website usage. This could be due to

factors, such as the clarity or completeness of the FAQ content or citizens' limited exposure to or familiarity with the available information.

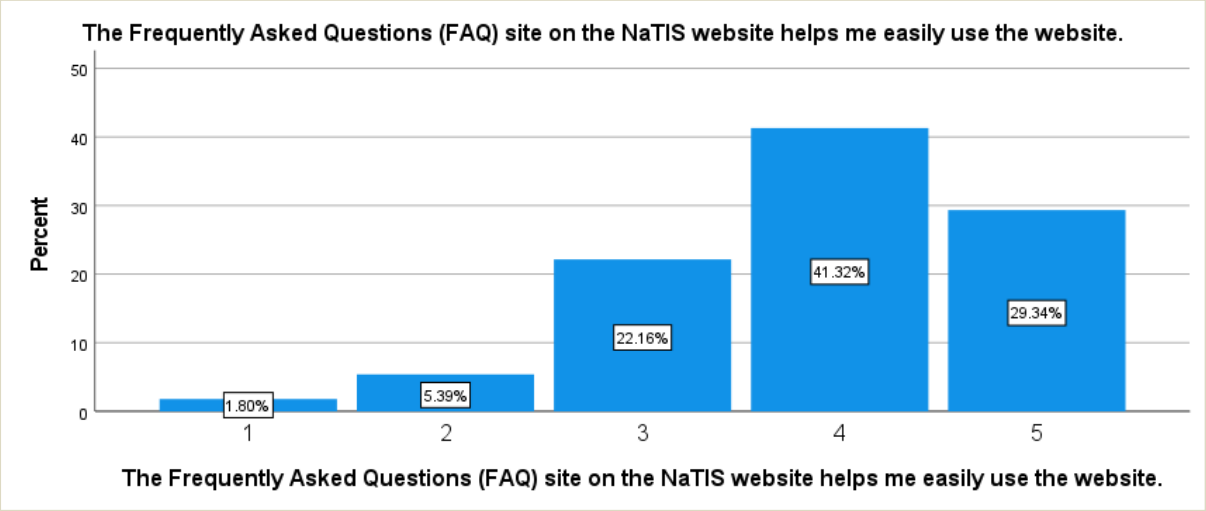

Figure 4. 18. NaTIS FAQs

4.5.3.7. Citizens' comments regarding Facilitating Conditions

Based on the responses provided by the respondents, the following themes have been identified regarding facilitating conditions towards acceptance and use of the NaTIS:

- Insufficient FAQs: Most respondents indicated that the FAQs page lacks information, as shown by one of the statements, *"The FAQs only has few answers. It was not expanded wide enough to broadly cover all areas"* (Participant 36). This emphasizes the need for an expanded, more inclusive set of answers to cater to a broader range of queries, as this will also improve NaTIS users' satisfaction.
- Absence of Chat Support Option: Most respondents highlighted the unavailability of *"chat with an agent missing!"* (Participant 3), as frustrating since they believe this assists with resolving queries quickly. Not having this functionality on the NaTIS website limits citizens' ability to seek immediate assistance and resolve their issues quickly.
- Quick Response but Inadequate Solutions: One respondent indicated that the NaTIS response is quick, but most of their responses do not solve their queries, as supported by the following statement, *"When I logged a query about reset password function not working, they responded quickly but with no solution. They*

admitted the website had a lot of technical issues" (Participant 82). This shows a need to improve technical support and problem-solving capabilities.

- Technical Issues with the Website: Respondents mentioned that the support team acknowledged technical issues with the website, which suggests a potential problem with the overall functionality and reliability of the NaTIS website, which therefore requires attention and improvement.
- Removal of Reprinting Option: The statement "*They should allow you to reprint your vehicle license renewal request; it seems this now has been removed, and you can only use their service via courier to get your disc."* (Participant 21). This shows NaTIS users' dissatisfaction with the removal of the option to reprint vehicle license renewal requests. This restriction forces users to rely solely on courier services to obtain their vehicle disc, which may only be convenient for some users. This indicates that the removed functionality was useful and important to motorists, hence, reintroducing them could improve the acceptance and use of NATIS.
- Need for Self-Service Options: Most respondents suggested that DLTCs should consider putting self-service machines at their centres to assist individuals who do not have access to computers, smartphones, or the Internet, as shown by the following statement, *"They should put self-service machines in their customer centre offices to assist people without computer, smartphones or internet."* (Participant 10). This will not only benefit citizens with no access to the above devices, but it could also promote the acceptance and use of the NaTIS. Moreover, this indicates a desire for more accessible and user-friendly alternatives for obtaining services.
- Application Status Issues: The statement *"Struggled with the application status most of the time. They should look into that"* (Participant 27), shows respondents face challenges related to the application status tracking feature. As a result, they recommend that the NaTIS system investigates and addresses these issues to enhance their experience and provide clearer updates on application progress.

Themes identified from respondents' feedback highlighted issues such as insufficient FAQs, absence of a chat support option, quick response but inadequate solutions, technical issues, removal of reprinting option, and the need for self-service options. Addressing these issues could enhance user experience and acceptance of NaTIS.

4.5.4. Perceived relatedness

Deci and Ryan (2017) in SDT define *perceived relatedness* as the degree to which individuals feel connected to others in their environment, for example, family members. Numerous factors can affect perceived relatedness, including the quality of social interactions and the level of support. Five statements were in this section, as shown in Table 4.13. All respondents completed all statements, and based on the mode values, most of the respondents agreed with the statements.

Table 4. 13. Perceived Relatedness Statements

		Perceived Relatedness				
		I feel more comfortable using the NaTIS website when support is provided timely by the NaTIS consultant.	I feel comfortable logging my query on the NaTIS website because I am confident it will be resolved.	The online support on the NaTIS website gives me enough guidance on navigating the website.	I found the NaTIS consultant helpful in helping me complete the application/registration/reporting on the NaTIS website.	The support I have received from the online NaTIS consultant increased my motivation to use the NaTIS website.
N	Valid	167	167	167	167	167
	Missing	124	124	124	124	124
Median		4.00	4.00	4.00	4.00	4.00
Mode		4	4	4	4	5

4.5.4.1. NaTIS consultants

The section on ‘NaTIS consultants’ evaluates participants' perceptions regarding the impact of timely support from NaTIS consultants on their comfort level when using the website. Timely support can include - timely responses to queries, clear guidance, and effective troubleshooting - which contribute to a positive user experience and promote the NaTIS website's continuous use. Based on Figure 4.19, approximately 78% of the respondents are positive that they feel more comfortable using the NaTIS website when timely support is provided by NaTIS consultants. This highlights that the availability of prompt assistance positively affects citizens' comfort level and confidence in utilizing the NaTIS website. In contrast, 19% of the respondents are uncertain about the impact of timely support on their comfort level, which could be due to a lack of previous experiences with or exposure to timely support from NaTIS consultants or varying levels of satisfaction with the support received. In addition, 2%

of the respondents disagreed that they feel more comfortable using the website when timely support is provided.

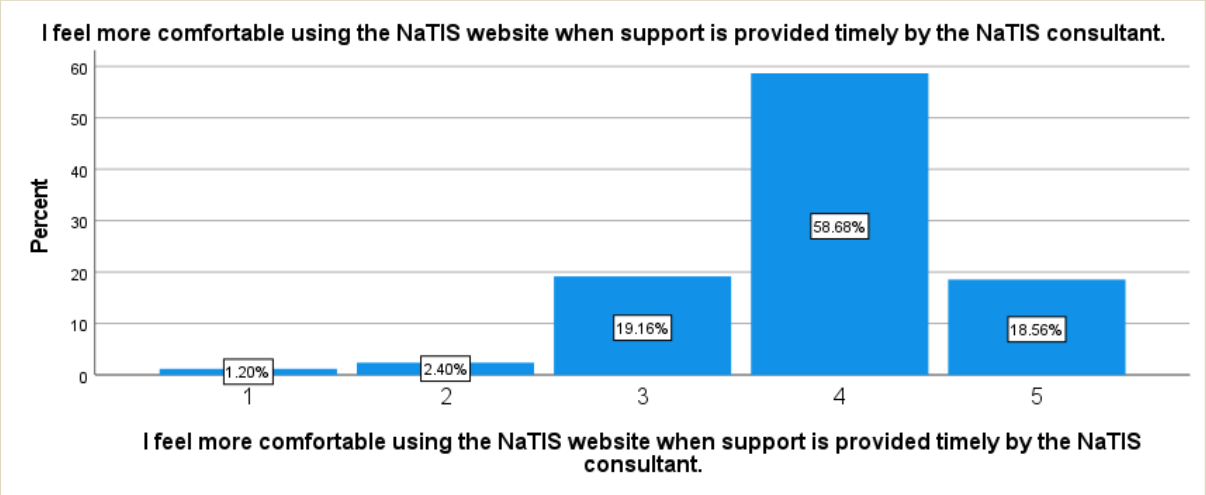

Figure 4. 19. NaTIS Online Support by Consultants

Based on the feedback received from respondents, it is recommended to ensure that NaTIS consultants provide consistent and timely support to users, as this positively impacts their comfort and confidence in using the website.

4.5.4.2. NaTIS queries

The NaTIS queries assess participants' comfort level and confidence in submitting queries on the NaTIS website, with the expectation that they will be resolved. Figure 4.20 shows that approximately 78% of the respondents are positive that they feel comfortable logging their query on the NaTIS website because they are confident it will be resolved, which also indicates that most citizens trust the system's ability to address and resolve their queries effectively; 16% of the respondents, however, are uncertain regarding their comfort level and confidence in query resolution on the NaTIS website, which could be due to their past experiences, perceived responsiveness, or familiarity with the query resolution process. Furthermore, 2% of

the respondents disagreed that they feel comfortable logging their query on the NaTIS website.

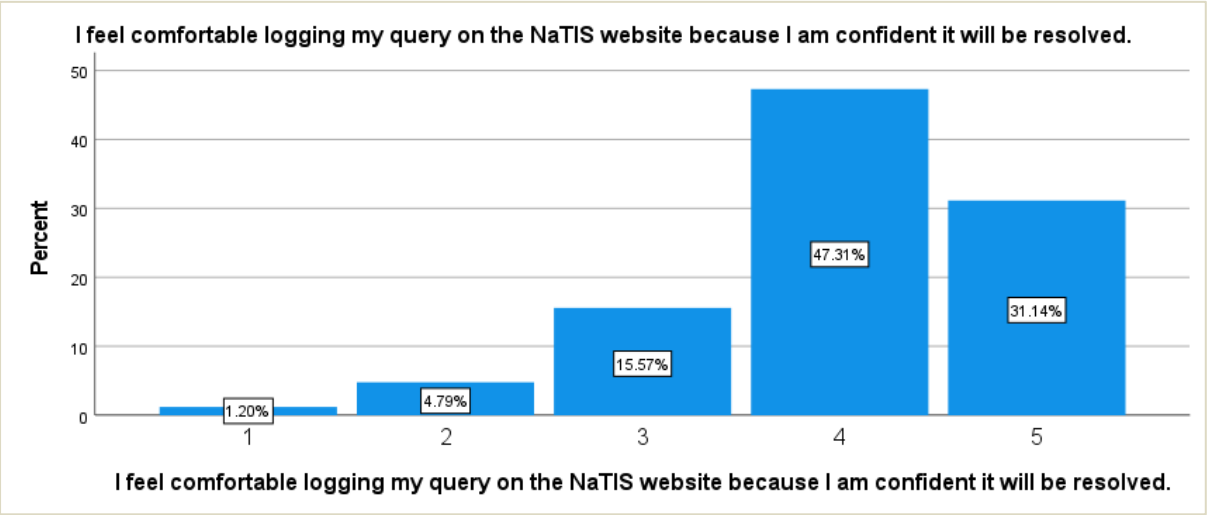

Figure 4. 20. NaTIS Query Support

To address the concerns of users who are uncertain about query resolution, it is recommended that the responsiveness and clarity of the query resolution process on the NaTIS website be enhanced.

4.5.4.3. NaTIS online support

The NaTIS online support evaluates participants' perception of the adequacy of online support in navigating the NaTIS website. According to Figure 4.21, nearly 83% of the respondents are positive that the online support on the NaTIS website provides them with enough guidance on navigating the website. This positive response suggests that most participants find the available online support resources helpful in understanding and navigating the various features and functionalities of the NaTIS website. Nonetheless, 11% of the respondents are uncertain about the adequacy of the online support in navigating them through the website; this may have originated from factors, such as the complexity of the website, the accessibility of support resources, or the participants' unfamiliarity with online support systems. Based on the findings drawn from Figure 4.21, citizens perceive the online support on the NaTIS website, including timely support from NaTIS consultants, as valuable. Citizens find the guidance provided by online support resources helpful in navigating the website, enhancing their comfort and confidence in using the NaTIS system. Respondents also expressed confidence in queries resolution, as contributing to a positive user experience.

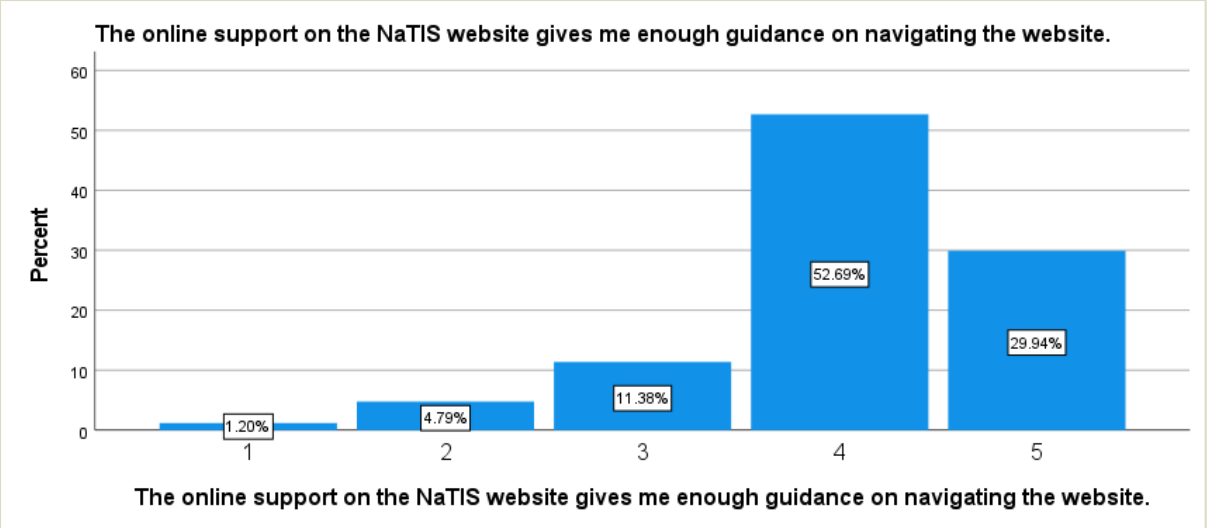

Figure 4. 21. NaTIS Online Support

To address the uncertainty expressed by some users regarding the adequacy of online support, it is recommended that the accessibility and clarity of online support resources on the NaTIS website be enhanced.

4.5.4.4. NaTIS Consultant

The NaTIS consultant evaluates participants' perception of the assistance provided by NaTIS consultants in accomplishing tasks on the website. Figure 4.22 illustrates that a significant percentage of participants strongly agree (37%) and agree (40%) that they found the NaTIS consultant helpful in assisting them complete their tasks on the NaTIS website. NaTIS users' positive feedback suggests that the consultants have effectively provided guidance, addressed queries, and facilitated task completion, however, a small portion of respondents (4%) disagreed. In comparison, 17% of the respondents were uncertain regarding the helpfulness of the NaTIS consultants in completing tasks on the website, which could be due to various reasons, such as, they

prefer other methods over interactions with consultants, differences in the complexity of tasks, or previous unsatisfactory experiences with support services.

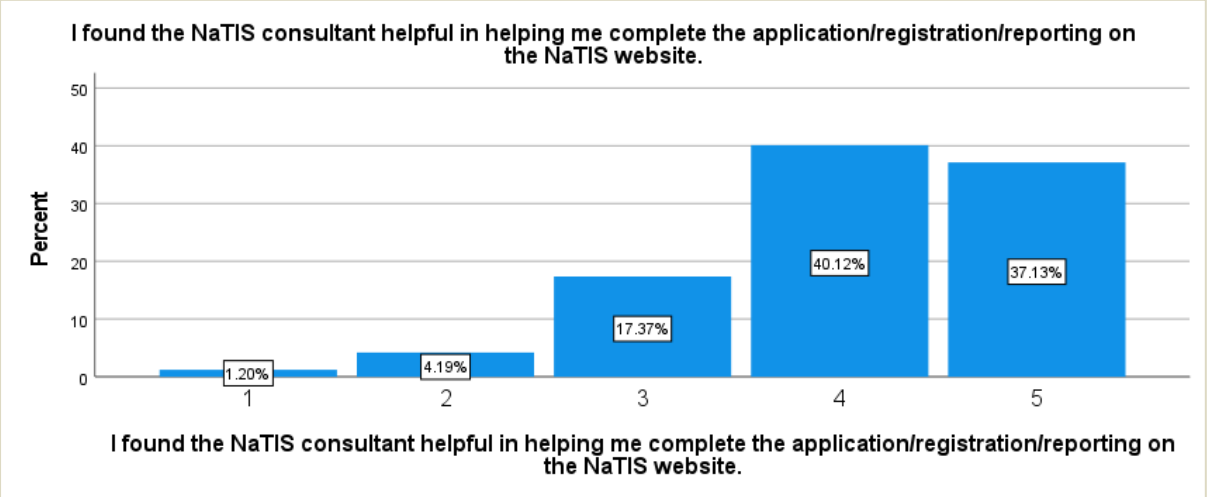

Figure 4. 22. NaTIS Consultant Assistance

To address the uncertainty expressed by some users regarding the helpfulness of NaTIS consultants, it is recommended that multiple support channels be offered and that consultants be adequately trained to assist users with diverse needs.

4.5.4.5. NaTIS Support importance

The NaTIS support importance section evaluates participants' perception of how the assistance provided by NaTIS consultants influenced their motivation to use the NaTIS website. According to Figure 4.23, 76% of the respondents are positive that the support from the online NaTIS consultant has increased their motivation to use the NaTIS website, which indicates that most citizens perceive the assistance provided by NaTIS consultants as motivating and encouraging, leading them to be more motivated to use the website. On the other hand, a portion of respondents (18%) were uncertain about the effect of the support from the NaTIS consultants on their motivation to use the website; this could be due to respondents' past experiences or differing levels of self-motivation; 4% disagreed with the statement.

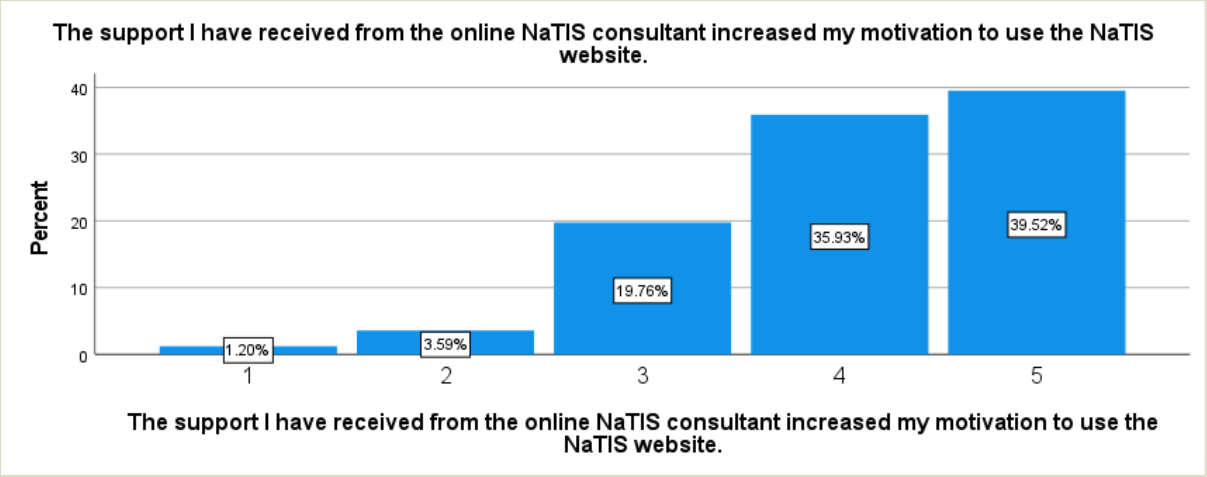

Figure 4. 23. NaTIS Support

It is recommended that the benefits of NaTIS support be communicated more effectively, and support offerings should be personalized to better align with users' needs and preferences to address the uncertainty expressed by some users regarding the impact of NaTIS support on their motivation.

4.5.5. Actual Usage & Continuous use of the NaTIS

The assessment of the system's actual usage and continuous use factor confirms a range of features - frequency, duration of use, user satisfaction, and the intention to maintain ongoing usage. This evaluation captures users' engagement patterns and willingness to sustain interaction with the system over time. Three specific statements were incorporated within this context, as outlined in Table 4.14.

After the analysis, the findings revealed a significant trend: most respondents agreed with the statements presented. These favorable responses reflect a positive tendency towards the system and suggest a favorable inclination towards continued and persistent utilization.

Table 4. 14. Actual Use and Continuous Use of the NaTIS

Actual Usage & Continuous Usage of the NaTIS

		The NaTIS website is set up to provide me with enough information and support I need.	I believe that I am using the NaTIS website correctly.	I would like to use the NaTIS website frequently
N	Valid	167	167	167
	Missing	124	124	124
Median		4.00	4.00	4.00
Mode		4	5	4

4.5.5.1. NaTIS information and support

Evaluating the NaTIS information and support was intended to explore whether the NaTIS website contains enough content information and support for citizens. Figure 4.24 shows that most citizens (approximately 81%) believe the NaTIS information is structured well and the support provided is sufficient. Fifteen per cent expressed uncertainty about the NaTIS information and support the system provides to citizens, however, a few citizens (4%) disagreed, suggesting they still need help with features, such as content clarity or clearness, online support, and NaTIS consultants.

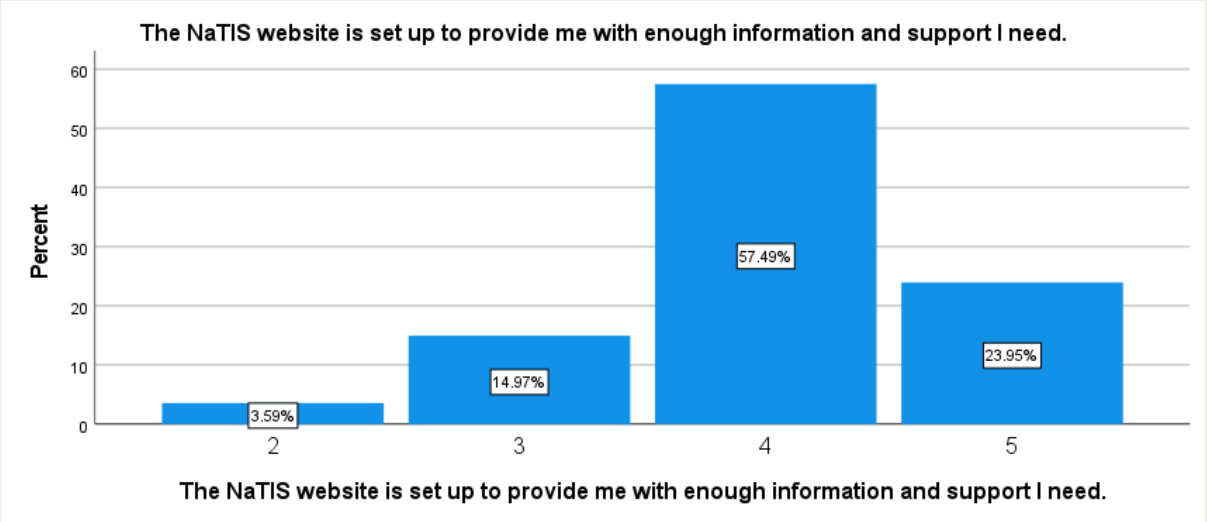

Figure 4. 24. NaTIS Information & Support

It is recommended that user testing and feedback be conducted to identify areas for improvement and address the concerns of users who feel uncertain or dissatisfied with the NaTIS information and support. This may involve enhancing content clarity, providing additional support resources, and ensuring that NaTIS consultants can readily assist users.

4.5.5.2. NaTIS usage

The NaTIS usage assesses participants' confidence in using the NaTIS website accurately. According to Figure 4.25, most (84%) of the respondents are positive that they are using the NaTIS website correctly. This positive response suggests that most citizens have acquired the necessary skills and knowledge to navigate and interact with the NaTIS website effectively. In comparison, about 14% of the respondents are uncertain regarding their usage of the NaTIS website, which could be due to a lack of

familiarity with certain aspects of the website. In addition, 2% of the respondents disagreed that they were consuming the NaTIS website correctly.

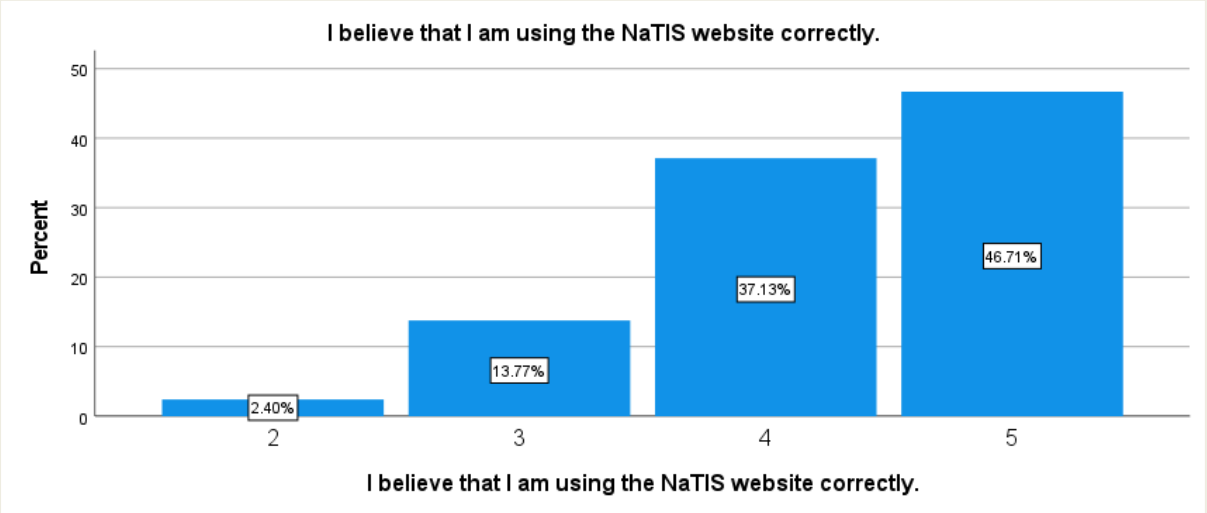

Figure 4. 25. NaTIS Actual Usage

It is recommended that additional user training and resources be offered to improve users' confidence and proficiency in using the system and address the uncertainty expressed by some users regarding their usage of the NaTIS website.

4.5.5.3. Willingness to continuously use the NaTIS

Willingness to continuously use the NaTIS sought to assess whether participants are willing to use the NaTIS continuously. The finding shows the respondents' acceptance and willingness to use the NaTIS continuously. Figure 4.26 shows that a significant number of respondents (approximately 84%) agreed, with 22% of the respondents strongly agreeing, showing their willingness to access the NaTIS services consistently; 13% of respondents remained uncertain, while 3% disagreed. These responses reveal the importance of addressing the concerns or challenges that citizens may have regarding the NaTIS. The overall acceptance and usage rates are more likely to increase if these concerns are addressed and more information and support are provided.

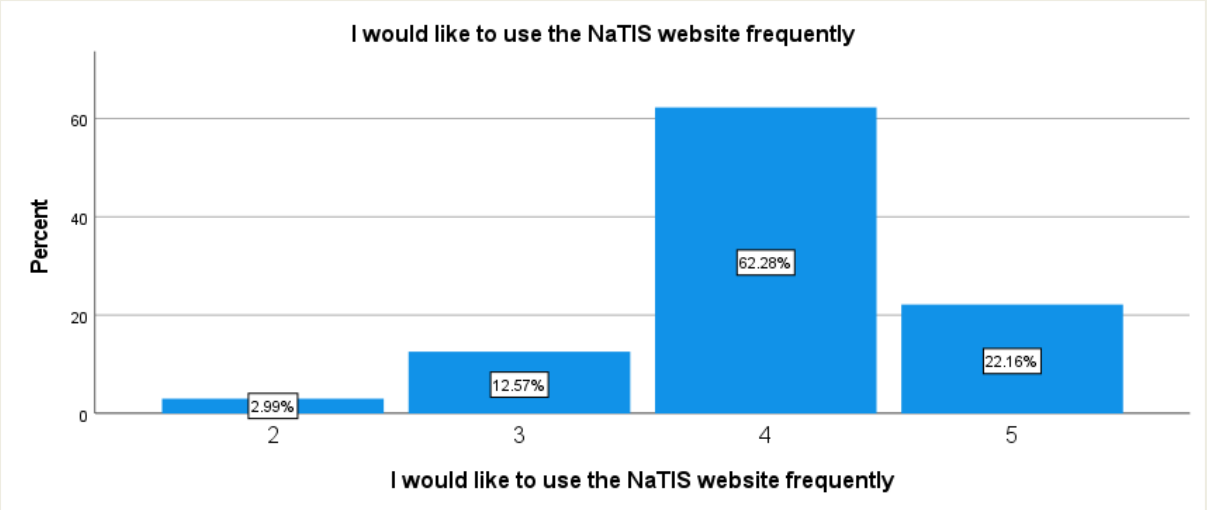

Figure 4. 26.NaTIS Continuous use

Figure 4.26 results show that there exists a promising level of acceptance and willingness to use NATIS continuously by the citizens. In addition, these results provide valuable insights for further development and improvement of the system, ultimately contributing to enhancing traffic information management and ensuring safer and more efficient road networks.

To address the uncertainty expressed by some users regarding their willingness to continuously use the NaTIS, it is recommended that the benefits of the NaTIS system be communicated more effectively and that any concerns or challenges that may hinder users' ongoing usage be addressed.

4.5.5.4. Citizens' comments regarding Actual Usage and Continuous use of the NaTIS
Based on the responses provided by the respondents, the following themes were identified regarding actual usage and continuous use of the NaTIS:

- Importance of User-Friendliness: The statements - *"If they enhance the system to be straightforward and user friendly, I could use it regularly" and "Looking at how the NaTIS website works, I will not wish to continue with it, unless if they enhance it. Because it only drains my energy and I get nothing done in return"* – reiterate the importance of a straightforward and user-friendly NaTIS website. Citizens are willing to embrace and continuously use the NaTIS website if it is enhanced in terms of usability and ease of navigation.

- Slots mismanagement: Respondents were willing to accept and continuously use the NaTIS system; this was demonstrated by the statement - *"I would visit the NaTIS website whenever I need something, however, if you attempt to renew your card before it expires, the system tells you when it will expire. But it still allows you to continue booking, hence, wasting a slot"*. This shows consistent waste of slots on the NaTIS, which creates inconveniences.
- Inclusion of Vehicle Owners without Driver's License: Respondents suggested that the NaTIS website should allow vehicle owners without a driver's license to register and utilize the site for various purposes, such as change of ownership and fine payments. They stressed the importance of inclusivity and equal access for all vehicle owners.

The findings from exploring - Actual usage and Continuous use - of the NaTIS showed that enhancing - user-friendliness, efficiency, and inclusivity of the NaTIS website - while addressing the concerns expressed by the respondents, could lead to increased acceptance and utilization of the website.

4.6 Section B: NaTIS non-users

This section aimed to delve deeper into the reasons behind citizens' non-usage of the NaTIS and their willingness to adopt and use the system. The section has been divided into two parts: Part A presents the reasons for not using NaTIS, including adaptation to new technologies and years of working experience. Part B presents results about respondents' willingness to adopt and use the NaTIS. A total of 124 non-NaTIS users completed this section.

4.6.1. Part A: Reasons for not using the NaTIS

Adaptability to new technologies and years of working experience influenced technology adoption. However, a more detailed exploration of non-users' challenges was needed to understand their barriers to adoption comprehensively.

4.6.1.1 Adaptability level to new technologies

People who are adaptable to new technologies are more likely to be comfortable with change and more open to trying new things, therefore, they may be more willing to experiment with new technologies and to learn how to use them effectively.

Participants were asked to indicate their adaptability to new technologies. As per Figure 4.27, about 66% of the respondents indicated they are excellent at adapting to new technologies; 25% of the respondents rated themselves as good; 7% indicated that they are at an average level. In comparison, about 2% of the respondents indicated low adaptability to new technologies and no respondents showed a relatively low level of adapting to new technologies.

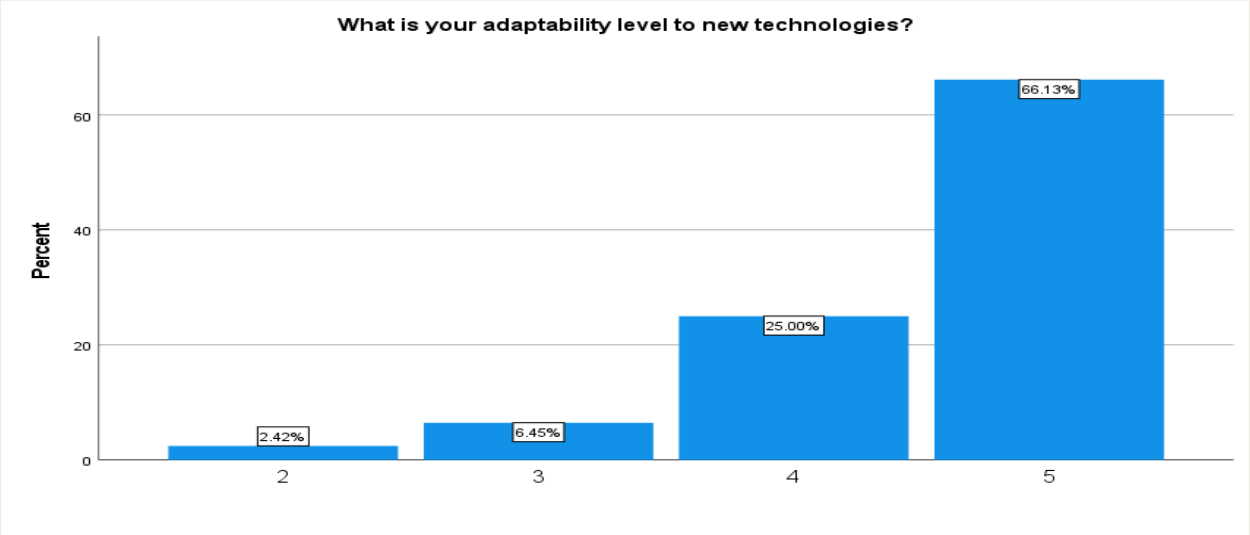

Figure 4. 27 Adaptability level to new technologies

In addition, Table 4.15 shows that most of the citizens not using the NaTIS have average to exceptional computer literacy skills and level of adapting to new technologies, with more than 62% of the respondents having excellent skills/levels in both cases.

Table 4. 15.NaTIS non-users vs Computer & Technology adaptability

NaTIS usage	Computer Literacy Skills		New technology adaptability level					Grand Total	%Grand Total
			very low	low	average	good	excellent		
			1	2	3	4	5		
I have never used it	very low	1	0	0	0	0	0	**0**	0
	low	2	0	2	1	1	1	**5**	4.03%
	average	3	0	0	4	9	2	**15**	12.10%
	good	4	0	1	3	18	5	**27**	21.77%
	excellent	5	0	0	0	3	74	**77**	62.10%

Grand Total		**0**	**3**	**8**	**31**	**82**	**124 / 291**	
%Grand Total		0	2.42%	6.45%	25.00%	66.13%		100%

The above results in Figure 4.27 show that most citizens are highly adaptable to new technologies. This is a positive indication for NaTIS adoption, as citizens who are adaptable and open to new technologies can facilitate the introduction of new systems. Additionally, the low percentage of respondents indicating low adaptability suggests that there may be few barriers to successfully training and supporting citizens in adopting the NaTIS system.

While the analysis highlighted that a significant percentage of respondents showed high adaptability to new technologies, it was essential to delve deeper into the experiences of those who perceived themselves as having lower adaptability. Further investigation into specific factors affecting their comfort with technology could have provided insights into potential barriers that must be addressed.

4.6.1.2 Years of working experience

Working experience is also linked to technology adoption because people with more experience in a particular field or industry may be more aware of new technologies benefits (Rogers, 2010). Participants, therefore, were also asked to indicate their years of working experience. Figure 4.28 illustrates that, most respondents (about 80%) have no working experience. Eleven per cent of the respondents indicated that they have two or fewer years of working experience, 3% have between 2 – 5 years of experience, and 3% have been working for at least five years.

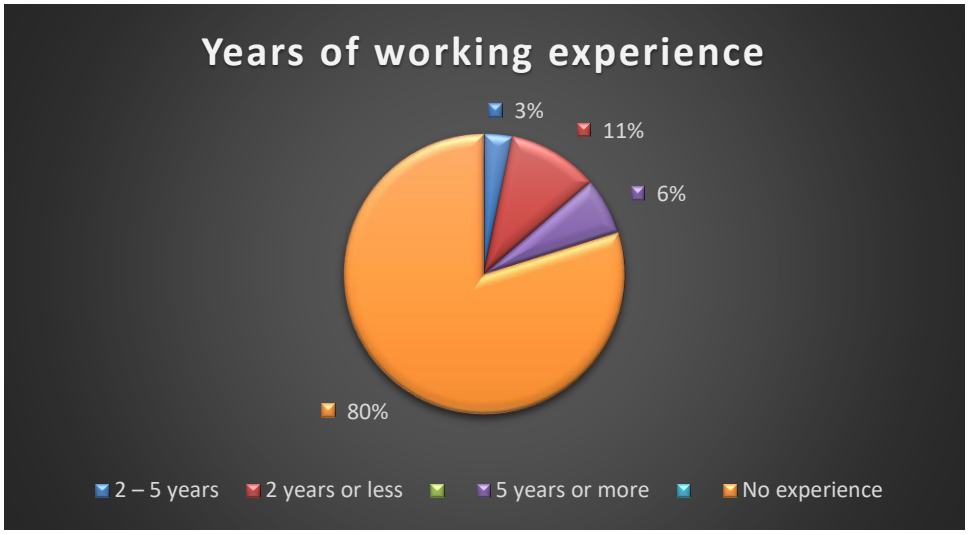

Figure 4. 28.Years of working experience

It was also crucial to ascertain the respondents' familiarity with the e-government concept and their prior usage of other government systems. As depicted in Table 4.16, a significant proportion (approximately 97%) of respondents without working experience also affirmed that they have not previously engaged with an e-government system.

As a result, most of these citizens may require more training and support to adapt to the NaTIS system. Contrarily, the relatively small portion (13%) of respondents with two or fewer years of experience and those with between two to five years, suggest that a significant number of citizens with some level of experience could adopt to the NaTIS system smoothly. Overall, these findings highlight the need for the NaTIS to provide sufficient training and support to citizens with no prior experience while also leveraging the knowledge and skills of citizens with more experience to facilitate the successful widespread adoption of the NaTIS system.

Table 4. 16. Working experience vs skills

NaTIS usage	Years of working experience	Years of using e-government systems				Grand Total	%Grand Total
		2 years or less	2 – 5 years	5 years or more	No experience		
I have never used it	2 years or less	3	0	0	10	**13**	3.23%
	2 – 5 years	0	0	0	4	**4**	10.48%
	5 years or more	1	2	2	3	**8**	6.45%

	No experience	2	1	0	96	**99**	79.84%
Grand Total		**6**	**3**	**2**	**113**	**124 / 291**	
%Grand Total		4.84%	2.42%	1.61%	91.13%		100%

The findings regarding respondents' years of working experience underscored the importance of considering individuals' familiarity with technology in the context of their professional backgrounds. However, a more nuanced discussion on how varying experience levels impacted attitudes towards technology adoption would have enriched the analysis.

4.6.1.3 Reasons for not using the NaTIS

Non-users of the NaTIS were asked about their reasons for not using the NaTIS system. Table 4.17 below shows the responses of the participants. Eighty percent of the respondents indicated that they do not use the NaTIS because they have never considered using it. Among these 80%, more than 90% of them did not choose any other reason why they had never considered using it, however, about 3% stated that it is because they have never heard of it, hence, they do not trust the application. In addition, 6% of the respondents (including 2% of the above 3%) indicated that they prefer to go to the offices. In total, 12% of the respondents indicated that they had never heard about the NaTIS, hence, they did not trust it. Two percent of the respondents say that they are not using the NaTIS because it needs to be more appealing and attractive to their eyes.

Table 4. 17. Reasons for not using the NaTIS

Reasons for not using the NaTIS[b]

			GenderID 0	GenderID 1	Total
Reasons for not using the NaTIS[a]	Other reasons	Count	1	0	1
		% within GenderID	1.1%	0.0%	
	I never really thought of using it.	Count	79	26	105
		% within GenderID	84.0%	86.7%	
	It is not appealing and attractive to the eyes.	Count	2	0	2
		% within GenderID	2.1%	0.0%	
	I prefer going to offices	Count	6	2	8
		% within GenderID	6.4%	6.7%	
	Always receiving the following error message	Count	1	0	1
		% within GenderID	1.1%	0.0%	
	I do not know which services I would be able to use via the website.	Count	1	0	1
		% within GenderID	1.1%	0.0%	
	Not all the services I need are availale	Count	3	1	4
		% within GenderID	3.2%	3.3%	
	I do not trust the application	Count	15	4	19
		% within GenderID	16.0%	13.3%	
	I have never heard of it before	Count	12	3	15
		% within GenderID	12.8%	10.0%	
Total		Count	94	30	124

Percentages and totals are based on respondents.

a. Dichotomy group tabulated at value 1.

b. GenderID_Keys: 0 - Females, 1 - Males

One respondent said that is difficult to get a slot on the NaTIS system as it keeps saying one is not eligible to request a slot, as shown in Table 4.18.

Table 4. 18. Error message

38. Error Message

1 Responses 1-1|1

ID ↑	Name	Responses
1	anonymous	I have been trying to submit the form for the booking slot. But it keeps saying I am not eligible to request a slot

The findings in Table 4.17 revealed that many respondents still need to consider using the NaTIS application. The main reasons cited were lack of awareness and trust issues. Additionally, some respondents preferred physical offices, and a few felt the application needed to be more visually appealing. Furthermore, one respondent cited

the difficulty of getting a slot, as he/she was deemed ineligible, as the reason for not using the application. Both Figure 4.17 and 4.18 results highlight the need to address various barriers to adoption to increase the NaTIS application uptake. Efforts must be made to increase awareness of the application, improve its reliability and accessibility, and address users' negative experiences to encourage more people to use the NaTIS for efficient and effective transport management.

While the reasons for non-usage were briefly touched upon, a more thorough examination of non-users' challenges was necessary. This included exploring technical barriers, usability concerns, trust issues, and lack of awareness in greater detail.

4.6.2. Part B: Citizens' Perceptions of NaTIS Adoption and Use

Analysing citizens' perceptions provided valuable insights into the role of social influence and ease of use in driving NaTIS adoption.

4.6.2.1. Social Influence

Venkatesh et al., (2003) define social influence as the extent to which an individual perceives the importance of using a system based on what others believe. Social influence plays a significant role in technology adoption. People may be influenced by the opinions and behaviours of those around them, such as family members, friends, colleagues, or even online communities. Four statements were included in this factor, as shown in Table 4.19.

Table 4. 19. Social Influence Statements

		Social Influence			
		People who are important to me think I should use the NaTIS website.	People who are familiar with me think I should use the NaTIS website.	The public marketing campaigns have influenced me to use the NaTIS website.	Most people surrounding me use the NaTIS website.
N	Valid	124	124	124	124
	Missing	167	167	167	167
Median		4	4	4	5
Mode		4	4	4	5

Table 4.19 mode values show that most citizens indicated that people around them encouraged them to use the NaTIS platform.

4.6.2.1.1. Willingness to use the NaTIS based on family and friends (close people) advice

Figure 4.29 presents the results for participants' willingness to use the NaTIS, based on advice from people who are important to them. The majority of respondents (over 85%) indicated that people who are important to them encouraged them to use the NaTIS. This suggests that the opinions and recommendations of people close to these respondents significantly influenced their decision to adopt and utilize the NaTIS. Additionally, these responses highlight the importance of social influence and interpersonal networks in promoting the adoption of the NaTIS, among citizens, however, a few respondents (approximately 6%) remain uncertain about the advice received from people important to them, regarding the NaTIS; therefore, addressing the uncertainties and providing additional information or support may be necessary to increase their confidence and willingness to adopt the NaTIS. Furthermore, approximately 8% of respondents indicated that people important to them were not encouraging them to use the NaTIS. Further investigation, understanding the reasons behind this perspective, and addressing any concerns or barriers raised by this group, may be important in promoting wider adoption of the NaTIS.

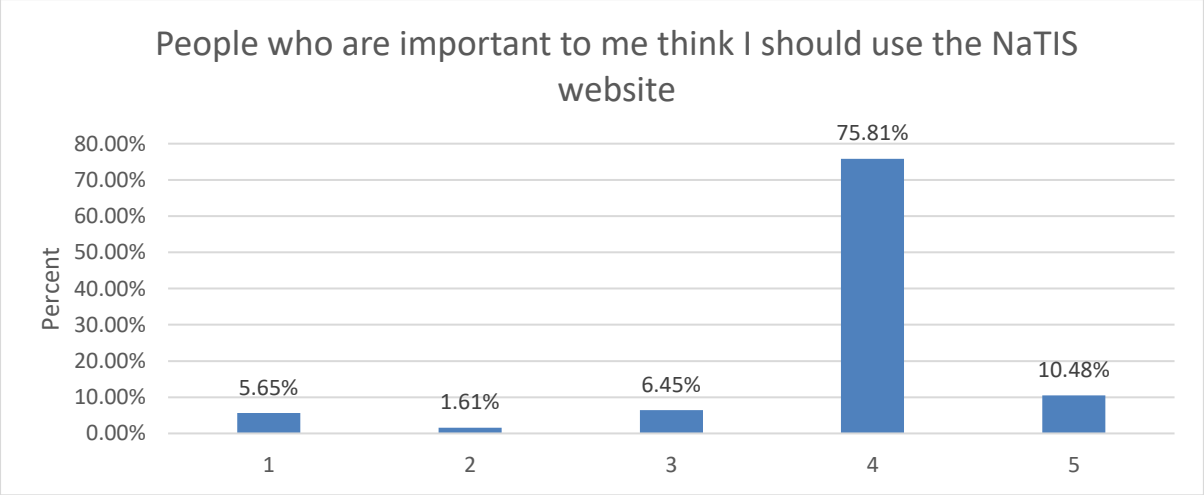

Figure 4. 29. Willingness to use the NaTIS (! important people)

The findings drawn from Figure 4.29 focused on the importance of interpersonal influence and support in driving the adoption and utilization of the NaTIS. As a result, leveraging social networks, addressing uncertainties, and addressing potential barriers can be key strategies in enabling greater acceptance and adoption of the NaTIS, among citizens.

4.6.2.1.2. Willingness to use the NaTIS based on known people's advice

Figure 4.30 provides the outcomes concerning participants' willingness to use the NaTIS based on advice from individuals who are familiar to them. Eighty-six per cent of respondents indicated that people familiar with them encouraged them to use the NaTIS. This testifies to the importance of social influence and recommendations from people with whom one has personal connections in shaping one's decision to adopt and utilize the NaTIS, however, 6% remain uncertain about the advice received from people familiar to them regarding the NaTIS. Addressing their uncertainties through clear communication, providing additional information, and promoting trust may be essential to increase people's confidence and willingness to adopt the NaTIS.

Furthermore, approximately 8% of respondents disagreed with the statement, meaning that people familiar with them are not encouraging using the NaTIS. A further study to understand the reasons behind this view and address any concerns or reservations raised by this group can help identify potential barriers to adoption and inform strategies to promote wider acceptance of the NaTIS.

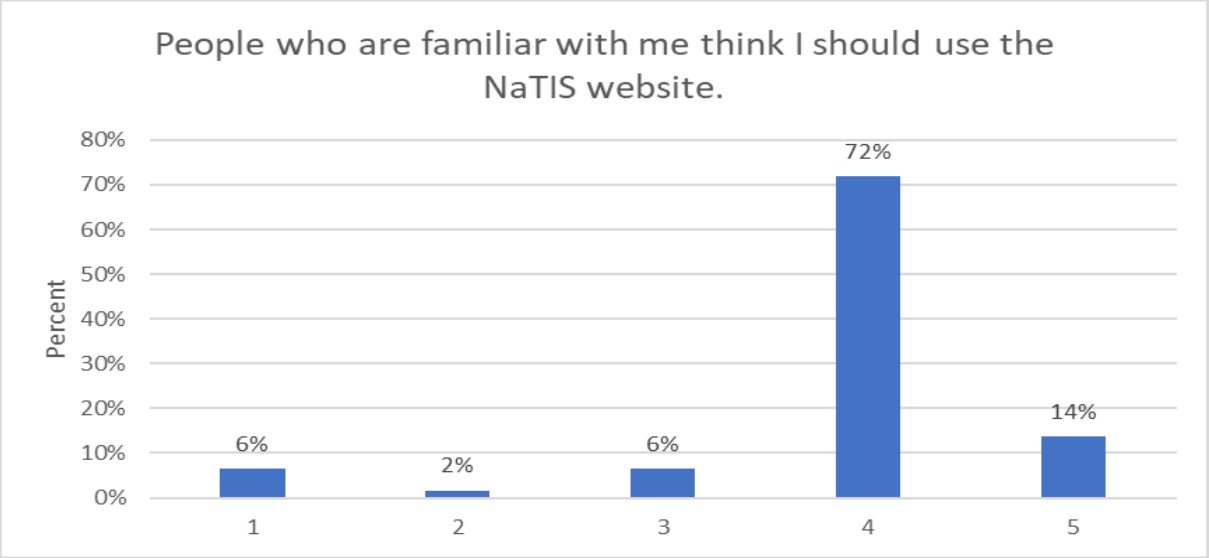

Figure 4. 30. Willingness to use the NaTIS (familiar people's advice)

Figure 4.30 results depict the importance of interpersonal relationships and recommendations from people familiar to the participants in influencing their decision to adopt the NaTIS, therefore, using these connections and addressing uncertainties and reservations can facilitate citizens' acceptance and adoption of the NaTIS.

4.6.2.1.3. Willingness to use the NaTIS based on public marketing advice

The willingness to use the NaTIS based on public marketing advice sought to evaluate whether participants could be willing to use the NaTIS based on influences from public marketing campaigns. Based on Figure 4.31, approximately 83% of respondents acknowledged that public marketing campaigns have encouraged them to use the NaTIS, which suggests that effective and persuasive marketing efforts significantly influenced their decision to adopt and utilize the NaTIS. A small percentage of respondents (8%) remain uncertain about the influence of public marketing campaigns on their willingness to use the NaTIS, therefore, addressing their uncertainties by providing clearer information through communication and highlighting the benefits of the NaTIS, may help increase their confidence and promote adoption. In addition, approximately 9% of respondents disagreed with the statement, indicating that public marketing campaigns have not influenced their decision to use the NaTIS. Further investigation to understand the reasons behind this perspective and addressing any concerns can be valuable in identifying potential barriers to adoption and informing strategies to enhance the impact of marketing campaigns.

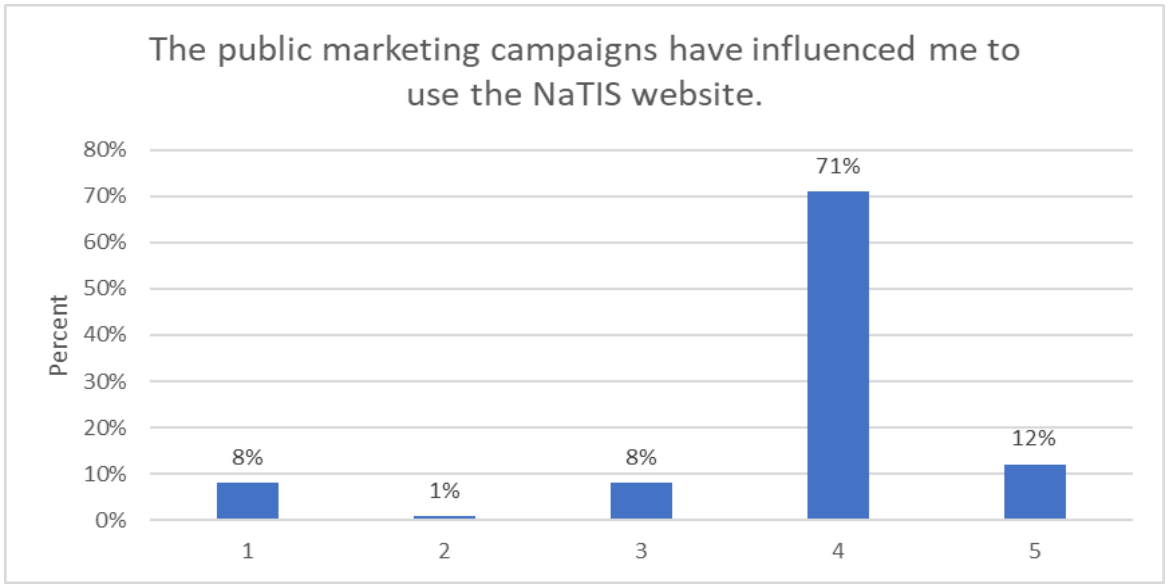

Figure 4. 31. Willingness to use the NaTIS (! Marketing campaign)

Figure 4.31 reflects the importance of effective public marketing campaigns in promoting the adoption of NaTIS, therefore, using initiatives like - clear messaging, providing accurate information, and addressing all of motorists' doubts - can assist in

maximizing the influence of public marketing campaigns and promote greater acceptance and adoption of the NaTIS among the citizens.

4.6.2.1.4. Willingness to use the NaTIS based on surrounding people

Participants were asked to indicate whether they have people around them who are using the NaTIS. Based on Figure 4.32, approximately 84% of the respondents are responded in the positive, with a significant portion strongly agreeing that people around them use the NaTIS. This suggests a notable presence and utilization of the NaTIS within social circles, indicating potential positive social influence and familiarity with the website. Approximately 7% of respondents were uncertain whether people around them use the NaTIS, which may have stemmed from limited exposure or lack of awareness about their surrounding environment. To address participants uncertainties, communication and showcasing examples of the NaTIS usage by users around them may help increase non-users' familiarity and confidence in adopting the NaTIS. Furthermore, approximately 8% of respondents disagree with the statement, indicating that people around them are not using the NaTIS. Understanding the reasons behind this perspective and addressing any concerns or challenges raised by this group can be important in identifying potential barriers to adoption and addressing any negative perceptions associated with the NaTIS.

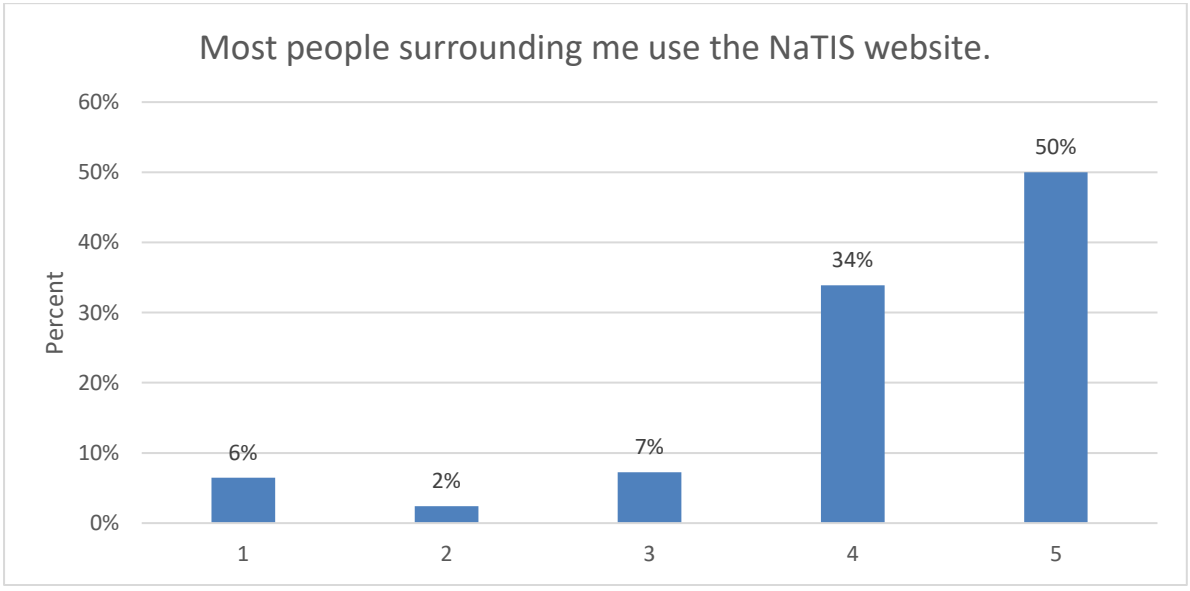

Figure 4. 32. Willingness to use the NaTIS (close people using it)

The findings, as shown in Figure 4.32, highlight the significance of social influence and NaTIS usage within citizens' social circles in promoting the adoption of the NaTIS.

Increasing visibility and addressing uncertainties can be key strategies to enhance adoption rates and promote widespread adoption and use of the NaTIS among the citizens' networks.

4.6.2.2. Ease of Use and Assistance

Exploring Ease of Use and Assistance was crucial to understanding the factors influencing non-NaTIS users' intentions, regarding adopting the NaTIS website. This section covers the factors surrounding the perceived simplicity of using the NaTIS website and the potential sources of guidance that citizens expect to aid their interaction with the system. It explores participants' perceptions, willingness, and confidence in navigating the system with ease (effort expectancy), and their perspective on facilitating conditions, which encompass external resources that contribute to the system's accessibility. A total of five statements were included in these factors, as illustrated in Table 4.20.

Table 4. 20. Intention to use the NaTIS

Statistics

		I could use the NaTIS website if I had the built-in help guide for assistance.	I could use the NaTIS website if someone showed me how to do it.	I could use the NaTIS website if I saw someone else using it.	I could use the NaTIS website if I could call someone for help.	I could use the NaTIS website if I had the built-in help facility for assistance.
N	Valid	124	124	124	124	124
	Missing	0	0	0	0	0
Median		5.00	4.00	4.00	4.00	4.00
Mode		5	4	4	4	4
Std. Deviation		.749	.662	.700	.669	.685

4.6.2.2.1. Willingness to use the NaTIS if built-in assistance is provided

Participants were asked whether they could use the NaTIS website if they had a built-in guide to assist them. Figure 4.33 shows that most respondents are positive about using the NaTIS if they had a built-in help guide, as 62% of them agree while 29% are strongly supporting it. About 5% of the respondents are uncertain, while 3% are not positive about using the NaTIS if they had a built-in guide to assist them.

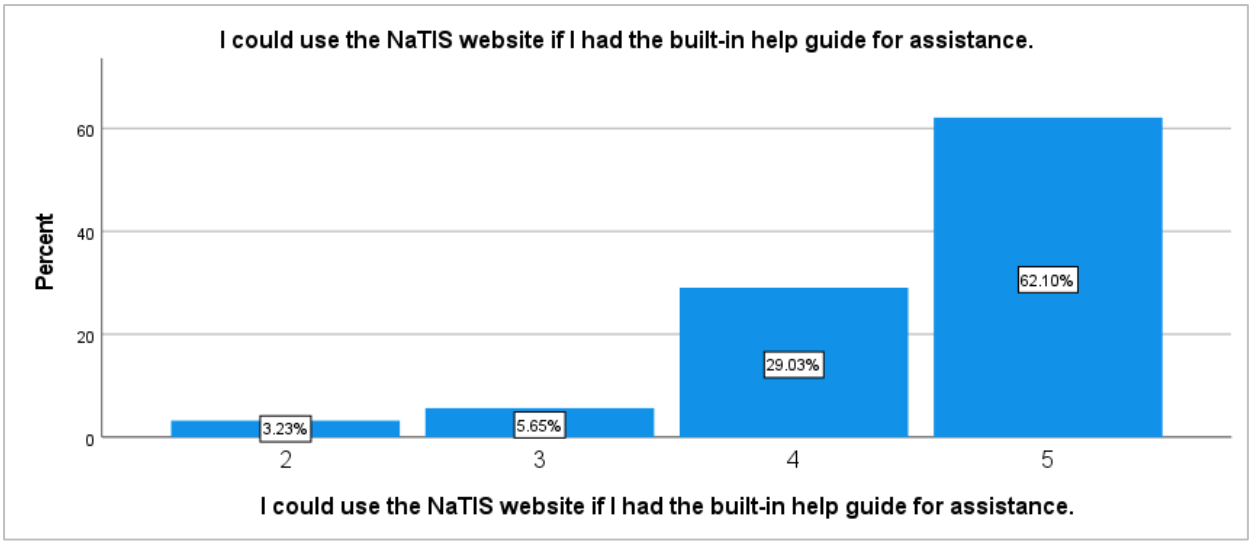

Figure 4. 33. Willingness to use the NaTIS (built-in guide assistance)

The Figure 4.33 analysis shows that participants are generally positive about using the NaTIS website, if they have a built-in guide to assist them. Most respondents agreed or strongly supported this idea, while only a small percentage were uncertain or not positive about it. This suggests that providing a built-in help guide may be an effective strategy for promoting the adoption of the NaTIS website among motorists. By making the website more accessible and user-friendly, it may encourage more people to use it and take advantage of the benefits it provides.

4.6.2.2.2. Willingness to use the NaTIS based on people's assistance

Participants were also asked about their willingness to adopt and use the NaTIS based on people's assistance. As illustrated in Figure 4.34, a significant portion (75%) of respondents agreed that they would be willing to use the NaTIS if someone assists them to understanding how to use it and find the specific services they require. The percentage of respondents who believe that help from others would be insufficient for adopting and using the NaTIS was relatively low (4%), although a small percentage (12%) of respondents remain unsure about their stance on this statement.

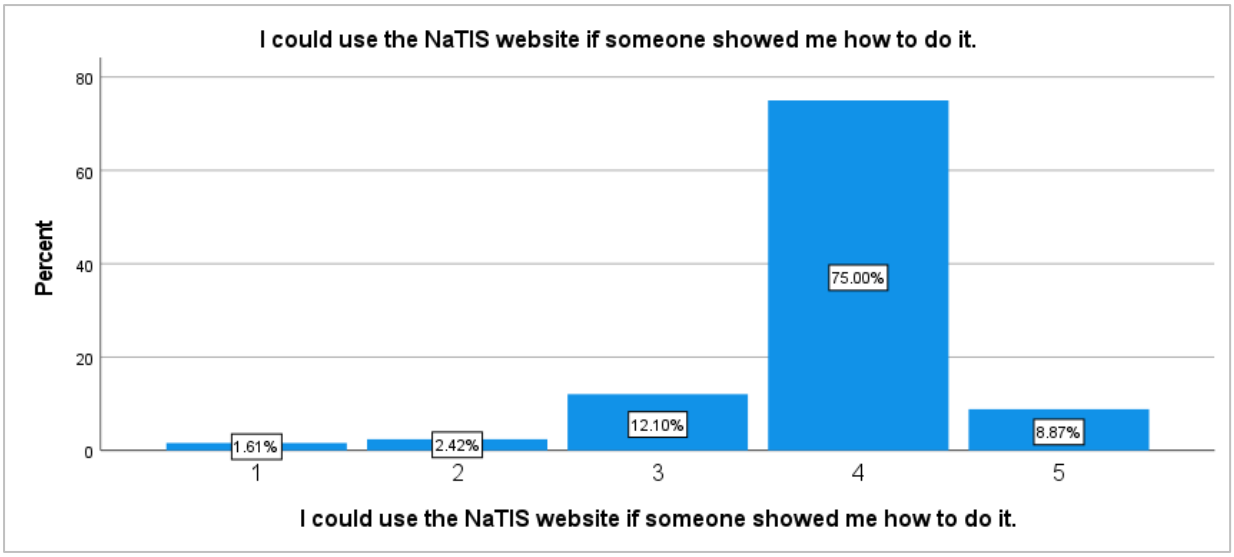

Figure 4. 34. Willingness to use the NaTIS (! someone help)

Figure 4.34 shows that most citizens are positive about adopting and utilizing the NaTIS services. These findings suggest that providing guidance and support from individuals could play a vital role in facilitating the adoption and use of the NaTIS among citizens. Ensuring accessible and user-friendly assistance may help bridge the gap for those who remain uncertain or require additional support in embracing the NaTIS services. Integrating effective assistance mechanisms, hence, could enhance the overall adoption and utilization of the NaTIS website.

4.6.2.2.3. Willingness to use the NaTIS based on people using it

Participants were asked whether they would adopt and use the NaTIS if they saw other people using it. Based on the data presented in Figure 4.35, a considerable proportion (approximately 60%) of respondents expressed willingness to use the NaTIS if they witnessed other people using it. This favourable response suggests that social influence significantly motivates individuals to adopt and utilize the NaTIS website, although around 35% of respondents remain uncertain whether seeing others use the NaTIS would influence their decision to use it. Only a small fraction (5%) of respondents perceives observing others using the NaTIS as insufficient motivation to adopt the website, however, the final point is that, most motorists have the intention of using a system based on other people close to them using it as well.

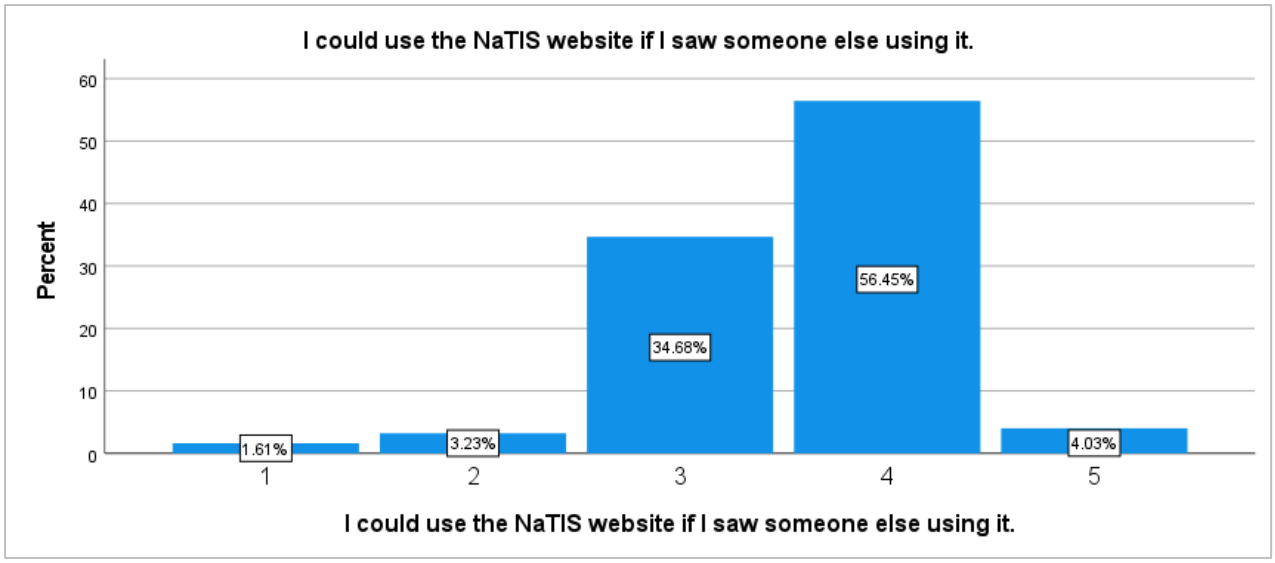

Figure 4. 35. Willingness to use the NaTIS (! Others using it)

These results in Figure 4.35 illustrate the importance of social influence as a potential driving force in adopting technology, such as the NaTIS. Leveraging positive social proof and creating visibility of others' positive experiences with the NaTIS may further enhance its adoption rate among potential users. Additionally, addressing the concerns and uncertainties of those who remain unsure could promote people's greater confidence and willingness to adopt the NaTIS.

4.6.2.2.4. Willingness to use the NaTIS based on people being available to call for help

Participants were asked whether they could use the NaTIS website if they had people on whom they can call for help. Figure 4.36 shows that majority (79%) of respondents agreed to utilize the NaTIS if there is a provision for contacting individuals for help. This positive response highlights the importance of having a strong and reliable support system to address NaTIS users' queries or concerns while they are navigating the platform. A small percentage (5%) of participants, however expressed disagreement with this statement, indicating that they may not perceive the availability of help as a determining factor in their adoption of the NaTIS. A portion (16%) of respondents remain uncertain about their stance on this case, demonstrating the need for clear and effective communication regarding available assistance channels within the NaTIS system.

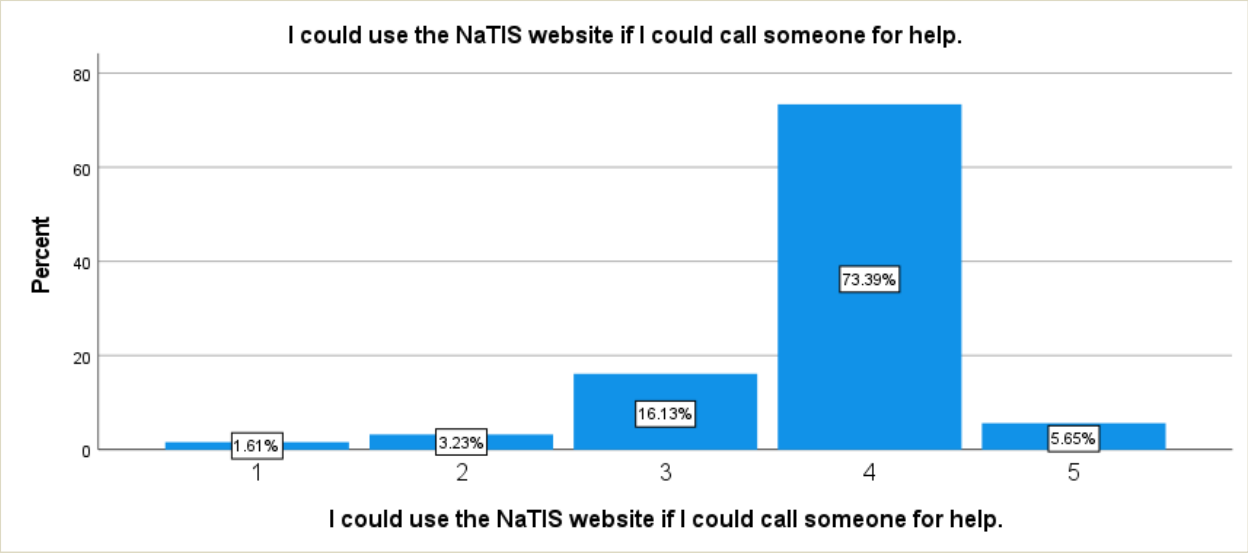

Figure 4. 36. Willingness to use the NaTIS (others help)

The results in Figure 4.36 shows that providing accessible and reliable assistance through phone calls may be an effective strategy to facilitate adopting and using of the NaTIS website.

4.6.2.2.4. Willingness to use the NaTIS if built-in facility assistance is provided

Participants were asked about their willingness to use the NaTIS website if they had a built-in help facility for assistance. Based on Figure 4.37, most respondents (84%) were positive towards adopting and using the NaTIS if there is a built-in help facility to assist. This indicates that incorporating a help feature within the NaTIS website may significantly promote its adoption among motorists, although approximately 12% of respondents remain uncertain about this statement. This suggests the need for further communication and clarification regarding the benefits and functionalities of the built-in help facility to address any reservations or uncertainties among potential users. Additionally, a small fraction (approximately 4%) of respondents expressed disagreement with the statement.

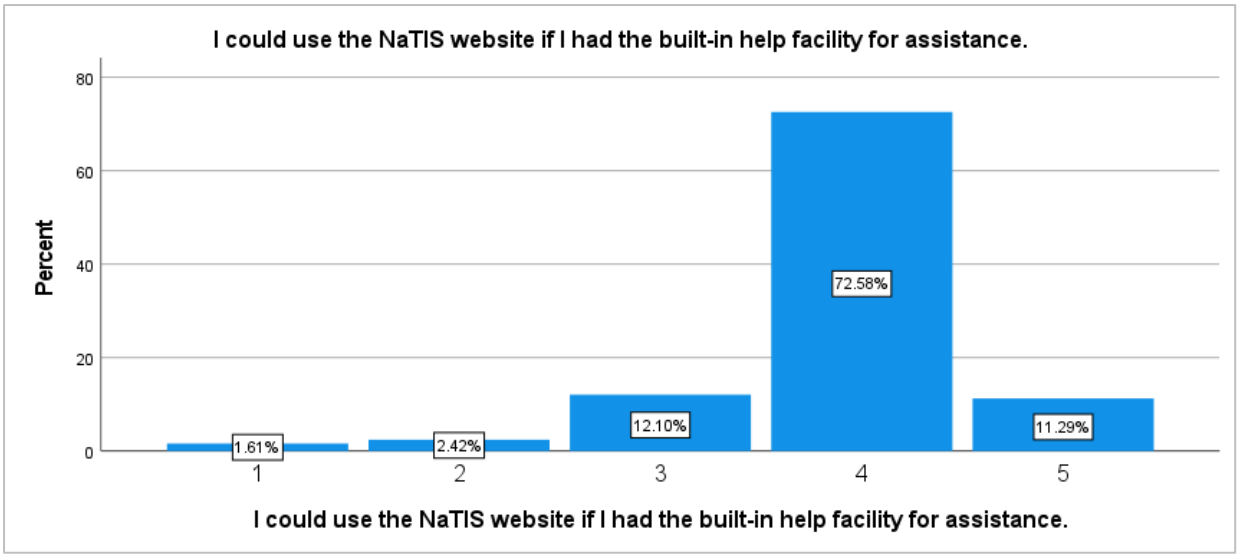

Figure 4. 37. Willingness to use the NaTIS (! built-in help facility)

The results in Figure 4.37 highlight the importance of providing accessible and user-friendly assistance options within the NaTIS website to facilitate its adoption and utilization among motorists.

4.6.2.2.5. Citizens' comments regarding Actual Usage and Continuous use of the NaTIS

Based on the responses provided by the respondents, the following themes were identified regarding the role of social influence in the adoption and use of the NaTIS:

- Lack of Knowledge: The statement *"I know nothing of the NaTIS website"* (Participant 42), shows the need to assist citizens with more knowledge so as to become familiar with the NaTIS website, indicating room for improvement in promoting and raising awareness about the website.
- Potential for Daily Use: Some respondents have the intention of using the NaTIS website frequently, suggesting that it has the potential to become an integral part of their routine.
- Glitches and System Issues: The statement - *"Sometimes it is not only about people close to you influencing you, but the system has plenty of glitches" (*Participant 11) - acknowledges that the website has glitches and system issues that can negatively impact the citizens' experience with the system. They believe these issues can influence their perception and usage of the website.

- Importance of Technology and Social Influence: Respondents highlighted the significance of using advanced technologies and the influence of social factors today. They believe technology, such as the NaTIS website, is important for improving communication and interaction among people from diverse backgrounds and societies. They suggested that social influence plays a role in promoting the adoption of new technologies.
- Lack of Guidance: Some respondents highlighted insufficient guidance, particularly for individuals with low or no computer skills, as shown by the following statement *"There is not enough guidance for someone with low to no computer skills"* (Participant 93). This implies that the complexity of the NaTIS website may hinder adoption and use for those who need to be better versed in using computers.

The above results show that promoting awareness, improving usability, ongoing innovation, and providing user-friendly guidance and support could increase the adoption and use of the NaTIS website.

4.7. Correlation and Regression Analysis

4.7.1. Correlation Analysis

Correlation analysis is a statistical technique used to measure the relationship between two or more variables (Mukaka et al., 2012; Bland & Altman, 1986). It is commonly used in social science research to explore the association between different variables and test hypotheses about these associations' nature and strength.

The widely used correlation analysis is Pearson's correlation coefficient, which measures the strength and direction of the linear relationship between two continuous variables (Bland & Altman, 1986). The correlation coefficient ranges from -1 to +1, with a value of 0 indicating no correlation, a value of -1 indicating a perfect negative correlation, and a value of +1 indicating a perfect positive correlation. In general, the strength of the correlation can be described as follows: a correlation coefficient between -0.1 and +0.1 is negligible, while between -0.3 and +0.3 is considered weak. A correlation coefficient between -0.4 to - 0.6 and +0.4 to +0.6 is moderate, while between -0.7 to -0.7 and +0.7 to +0.9 is considered strong. A correlation coefficient between -1 and +1 is very strong. The Pearson correlation will be adopted in this study.

Table 4.21 shows the correlation analysis results of the relationships between various constructs.

Table 4. 21. Correlations (NaTIS users)

CORRELATIONS							
PEARSON CORRELATION N = 167			PERFORMANCE EXPECTANCY	EFFORT EXPECTANCY	FACILITATING CONDITIONS	PERCEIVED RELATEDNESS	ACTUAL USAGE & CONTINUOUS USE OF THE NATIS
		PERFORMANCE EXPECTANCY	1				
	SIG. (2-TAILED) = <.001	EFFORT EXPECTANCY	.679**	1			
		FACILITATING CONDITIONS	.526**	.749**	1		
		PERCEIVED RELATEDNESS	.512**	.671**	.654**	1	
		ACTUAL USAGE & CONTINUOUS USE OF THE NATIS	.612**	.752**	.737**	.688**	1
**. CORRELATION IS SIGNIFICANT AT THE 0.01 LEVEL (2-TAILED).							

The significance level of 0.01 indicates that the probability of observing correlation coefficients by chance alone is very low (less than 1%). This suggests that the observed correlations are unlikely to result from random sampling errors but reflect a true association between the variables in the population from which the sample was drawn. Furthermore, the positive signs of the correlation coefficients indicate that as one variable increases, others also tend to increase, and vice versa.

The relationship between performance expectancy and effort expectancy were investigated for the acceptance and use of the NaTIS. The magnitude of the correlation coefficient of 0.679** between performance expectancy and effort expectancy on a significant level of 0.01, indicates a strong positive correlation between the two variables. This means that as performance expectancy increases, effort expectancy also tends to increase. The double asterisks (**), which indicate statistical significance, mean that the probability of observing such a correlation coefficient by chance is less than 1 in 100, providing strong evidence that the correlation is real and meaningful. There is evidence, therefore, to suggest that if people perceive that using the NaTIS website will result in better performance (that is,

it will save cost, time, and others), they may also perceive that it requires less effort to master it, and vice versa.

The relationship between performance expectancy and facilitating conditions were investigated for acceptance and use of the NaTIS. The magnitude of the correlation coefficient of 0.526** between performance expectancy and facilitating conditions with a significance level of 0.01 suggests a statistically significant moderate positive relationship between the two variables, with a high degree of certainty. That is, ** symbol indicates that the result is statistically significant at a level of 0.01, which means that there is a very low probability that this result is due to chance. This suggests that it is perceived that as facilitating conditions increase, so does performance expectancy, and vice versa. In other words, if individuals perceive that there are sufficient resources, support, and infrastructure to use the NaTIS website services, they are more likely to have higher expectations for their performance.

The relationship between performance expectancy and perceived relatedness were investigated for acceptance and use of the NaTIS. A Pearson correlation coefficient of 0.512** between performance expectancy and perceived relatedness with a significance level of 0.01, suggests a statistically significant moderate positive relationship between the two variables, with a very high confidence level. This suggests that there is a meaningful relationship between performance expectancy (the extent to which users believe that using the NaTIS will help them to perform tasks effectively) and perceived relatedness (the extent to which users believe that the NaTIS is relevant and related to their needs and interests); therefore, if the performance expectancy is improved by enhancing the NaTIS website to meet users' needs and goals, the perceived relatedness could also be improved moderately. As a result, this will increase NaTIS users' experience levels, hence, widespread acceptance and use of the NaTIS.

The relationship between performance expectancy and actual usage and continuous use of the NATIS was investigated for acceptance and use of the NaTIS. The results of a correlation coefficient of 0.612** between performance expectancy and actual usage and continuous use of the NATIS with a significance level of 0.01, suggest a statistically significant strong positive relationship between the two variables, with a

very high confidence level. Overall, this suggests that higher levels of performance expectancy are likely to lead to increased usage of NaTIS.

The relationship between effort expectancy and facilitating conditions was investigated for acceptance and use of the NaTIS. A Pearson correlation coefficient of 0.749** between effort expectancy and facilitating conditions with a significance level of 0.01 suggests a statistically significant strong positive relationship between the two variables, with a high confidence level. This means that as the level of effort expectancy increases, so does the level of facilitating conditions. In other words, if individuals perceive that using the NaTIS website requires less effort, they are more likely to use it when there are adequate facilitating conditions, such as access to necessary resources and support. This information may be useful in identifying areas for improvement in the NaTIS system to increase user acceptance and engagement. Overall, this suggests that effort expectancy and facilitating conditions are important factors to consider in the adoption and continued use of the NaTIS website, especially, during times of crises such as the COVID-19 pandemic.

The relationship between effort expectancy and perceived relatedness was investigated for acceptance and use of the NaTIS. The magnitude of the correlation coefficient 0.671** between effort expectancy and perceived relatedness with a significance level of 0.01, suggests a statistically significant strong positive relationship between the two variables, with a high confidence level. This means that as the perceived relatedness of the NaTIS website increases, so does the ease of effort required to use the website. Conversely, as the perceived relatedness of the NaTIS decreases, the effort expectancy of using the system also decreases.

The relationship between effort expectancy and actual usage & continuous use of the NATIS was investigated for acceptance and use of the NaTIS. The results of a correlation coefficient of 0.752** between performance expectancy and actual usage and continuous use of the NaTIS with a significance level of 0.01, suggests a statistically significant strong positive relationship between the two variables, with a very high confidence level. This means that there is a tendency for users who find the NaTIS website easy to use (high effort expectancy) to also use it more frequently and consistently (high actual usage & continuous use); therefore, if the effort expectancy is improved by enhancing the NaTIS website to enable citizens easy navigate and find

the content they are looking for, they are more likely to continue using it. As a result, actual usage and continuous use of the NATIS will also improve.

The relationship between facilitating conditions and perceived relatedness was investigated for acceptance and use of the NaTIS. A Pearson correlation coefficient of 0.654** between facilitating conditions and perceived relatedness on a significance of 0.01 indicates a strong positive correlation between these two variables. This means that there is a significant relationship between the perceived facilitating conditions and relatedness of the NaTIS website. A correlation coefficient of .496** suggests that there is a moderate degree of association between the two variables, and that the relationship is statistically significant at the 0.01 level, which means that the probability of obtaining such a large correlation coefficient by chance, is very low. This suggests that the perceived facilitating conditions of the NaTIS website may be an important factor in promoting its adoption and sustained use by citizens, particularly when these conditions are perceived to be related to the overall usefulness and relevance of the website.

A Pearson correlation coefficient of 0.737** between facilitating conditions and actual usage and continuous use of the NATIS on a significant level of 0.01 indicates a strong positive relationship between these variables. This means that higher levels of facilitating conditions are associated with higher levels of actual usage and continuous use of the NATIS; therefore, enhancing the facilitating conditions, such as providing adequate resources and support to NaTIS, will moderately improve the actual usage and continuous use of the NATIS.

The relationship between perceived relatedness and actual usage & continuous use of the NATIS was investigated for widespread acceptance and use of the NaTIS. Based on Table 4.21, the magnitude of the correlation coefficient of 0.688** between perceived relatedness and actual usage & continuous use of the NaTIS website indicates a strong positive correlation between these variables. This means that there is a significant relationship between the perceived relatedness of the NaTIS website and the actual usage and continuous use of the website by citizens during and after the Covid-19 pandemic in South Africa. A correlation coefficient of 0.688** indicates that there is a high degree of association between the two variables, and that the

relationship is statistically significant at the 0.01 level, which means that the probability of obtaining such a large correlation coefficient by chance is very low. This suggests that the perceived relatedness of the NaTIS website may be an important factor in promoting its adoption and sustained use by citizens especially during times of crises such as the COVID-19 pandemic.

Table 4. 22. Correlations (Non-NaTIS users)

CORRELATIONS				
PEARSON CORRELATION N = 124		SOCIAL INFLUENCE	BEHAVIOURAL INTENTION	
	SOCIAL INFLUENCE	1	.643**	
	BEHAVIOURAL INTENTION	.643**	1	
	SIG. (2-TAILED) = <.001			
****. CORRELATION IS SIGNIFICANT AT THE 0.01 LEVEL (2-TAILED).**				

The relationship between social influence and behavioural intention to use the NATIS was investigated for widespread adoption and use of the NaTIS. As illustrated in Table 4.22, the magnitude of the correlation coefficient of 0.643** indicates a strong positive relationship between these two variables. The relationship is statistically significant at the 0.01 level, which means that the probability of obtaining such a large correlation coefficient by chance is very low. This suggests that social influence may be an important factor in promoting NaTIS adoption and sustained use by citizens, especially during crises, such as the COVID-19 pandemic.

4.7.2. Regression Analysis

Regression analysis will be adopted to examine the relationship between one dependent variable and one or more independent variables. It will be used to determine to what degree performance expectancy, effort expectancy, facilitating conditions, and perceived relatedness influence the acceptance and continuous use of NaTIS; this extends to social influence on the behavioural intention to use the system on non-users. Based on the results in Table 4.23 and Table 4.24, the predictor variables accounted for at least up to 67% (Adjusted R square = 0.678) of the variance under NaTIS system acceptance and continuous use. The results show that - Performance Expectancy (Beta = 0.154, Sig=0.013), Effort Expectancy (Beta = 0.260, Sig=0.002), Facilitating Conditions (Beta = 0.311, Sig=<0.001), and Perceived

Relatedness (Beta = 0.231, Sig=<0.001) - are significant predictors of NaTIS system acceptance and continuous use. Facilitating Conditions and Effort Expectancy contributed to more positive changes; hence, they should be prioritized for widespread acceptance of the NaTIS system and its continuous use.

Table 4. 23. Coefficients (NaTIS Users)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	.723	.186		3.890	<.001	.356	1.090
	PE	.128	.051	.154	2.524	.013	.028	.228
	EE	.221	.069	.260	3.207	.002	.085	.358
	FC	.275	.063	.311	4.392	<.001	.152	.399
	PR	.209	.057	.231	3.634	<.001	.095	.322

a. Dependent Variable: CU

Table 4. 24. Model Summary (NaTIS Users)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.823[a]	.678	.670	.34955	.678	85.243	4	162	<.001

a. Predictors: (Constant), PR, PE, FC, EE

Table 4. 25. Non-NaTIS users

Hypothesis	Regression Weights	Beta Coefficient	R^2	F	p-value	Hypothesis Supported
H5	SI -> BI	.400	.413	85.963	<.001	**Yes**

4.7.3. Hypothesis Testing

This section discusses the hypotheses formulated to examine the relationships among key factors and their impact on users' behavioural intention to adopt and use the NaTIS website.

4.7.3.1. NaTIS Users

A multiple regression analysis was conducted to investigate the factors influencing the use and continuous usage of the NaTIS website. The dependent variable, “Actual Usage & Continuous Use”, was examined with various independent variables, specifically, Performance Expectancy (PE), Effort Expectancy (EE), Facilitating Conditions (FC), and Perceived Relatedness (PR).

$H1_0$: Performance expectancy has no influence on behavioural intention to use the NaTIS system.

$H1_1$: Performance expectancy influences behavioural intention to use the NaTIS system.

Results:

Table 4.23 shows that the coefficient for performance expectancy (PE) was found to be statistically significant (Beta = 0.154, Sig=0.013), indicating a meaningful association between this factor and users' actual usage and continuous use of the NaTIS behaviour. Furthermore, this is supported by the unstandardized coefficient, which emphasizes the meaningful influence of performance expectancy on continuous usage, even in the presence of other factors. The regression analysis results, therefore, provide empirical support for the idea that performance expectancy holds significance in shaping users' behavioural intention and subsequent continuous usage of the NaTIS website, hence, we **accept alternative hypothesis** and reject the null hypothesis.

$H2_0$: Effort expectancy has no influence on behavioural intention to use the NaTIS system.

$H2_1$: Effort expectancy influences behavioural intention to use the NaTIS system.

Results:

The regression analysis findings in Table 4.23 reveal a significant relationship between Effort Expectancy and users' Continuous Usage of the NaTIS system. The positive standardized coefficient (Beta = 0.260, Sig=0.002) suggests that perceived ease of use plays an important role in influencing individuals' intentions to adopt and continue using the NaTIS platform. The positive coefficient emphasizes that when citizens perceive the system as effortless and user-friendly, they are more inclined to continue

using it. This highlights the need to simplify user interactions, provide intuitive navigation, and minimize complexity within the NaTIS website. Additionally, this provides enough evidence to support the proposed hypothesis, therefore, the **alternative hypothesis is accepted,** while the null hypothesis is rejected.

$H3_0$: Facilitating conditions have no influence on behavioural intention to use the NaTIS system.

$H3_1$: Facilitating conditions influence behavioural intention to use the NaTIS system.

Results:

As illustrated in Table 4.23, the regression analysis results revealed a significant positive relationship between facilitating conditions and actual usage and continuous use of NaTIS. Specifically, an increase in facilitating conditions was associated with a corresponding increase in adoption and sustained use of the NaTIS. These findings highlight the importance of creating an environment enabling users to easily access and utilize the NaTIS system, aligning with the goal of promoting effective technology adoption and integration. The results show (Beta = 0.311, Sig=<0.001), therefore, we have enough evidence to reject the null hypothesis, hence, the **alternative hypothesis is accepted.**

$H4_0$: Perceived relatedness has no influence on behavioural intention to use the NaTIS system.

$H4_1$: Perceived relatedness influences behavioural intention to use the NaTIS system.

Results:

The results in Figure 4.23 revealed a statistically significant positive association (Beta = 0.231, $p < 0.001$) between perceived relatedness and the users' behavioural intention to use the NaTIS system. This finding supports the hypothesis that perceived relatedness influences users' intentions to engage with the NaTIS platform. The analysis also emphasizes the importance of users' perception of relatedness in shaping their motivation to adopt and continue using the system. Therefore, we have enough evidence to reject the null hypothesis and **accept the alternative hypothesis.**

$H5_0$: Social influence has no influence on behavioural intention to use the NaTIS system.

$H5_1$: Social influence influences behavioural intention to use the NaTIS system.

Results:

The regression analysis results (Beta = 0.400, Sig < 0.001), in Table 4.25, show a strong, positive relationship between social influence and behavioural intention to use the NaTIS system among non-users. This means that when non-users perceive a strong social influence, they tend to show a more favourable attitude and intention to use the NaTIS. As such, significant evidence exists to reject the null hypothesis and **accept the alternative hypothesis.**

$H6_0$: Behavioural intention to use the NaTIS system has no influence on actual usage and continuous use of the system.

$H6_1$: Behavioural intention to use the NaTIS system influences actual usage and continuous use of the system.

Results:

The regression analysis results (Beta = 0.612, Sig < 0.001), as depicted in Table 4.23, reveal a strong, statistically-significant positive relationship between behavioural intention to use the NaTIS and actual usage and continuous use. This shows that an increase in the intention to use the system is associated with a subsequent increase in its usage and continuous use. We, therefore, do not have enough evidence to support the null hypothesis, hence, it is rejected, and the **alternative hypothesis is accepted.**

4.7.4. Final Refined Model

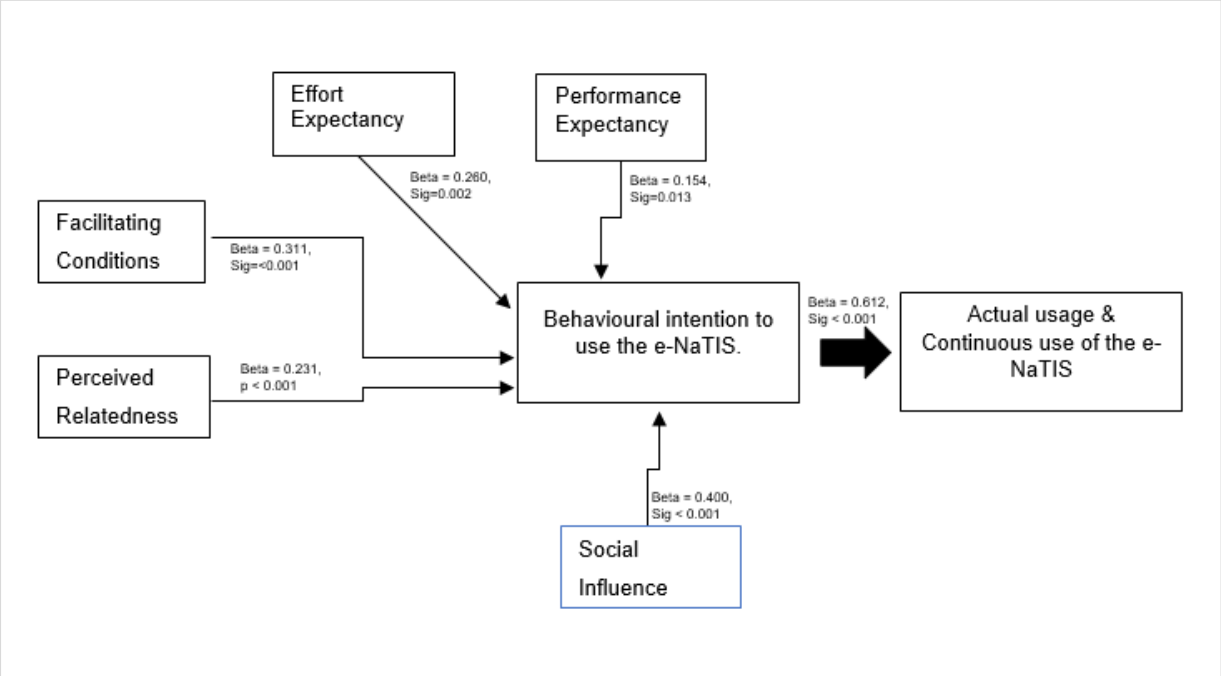

Figure 4. 38 Final Research Model

In the final research model (Figure 4.38), the study reveals the critical factors influencing users' behavioural intention and actual usage of the NaTIS system within the context of SA's e-Government services. The findings indicate that users' perceptions of performance expectancy, effort expectancy, facilitating conditions, perceived relatedness, and social influence (for non-users) significantly affect their intentions and actions related to the NaTIS platform. The research highlights a strong, positive correlation between users' behavioural intentions and subsequent system usage, emphasising the central role of user intentions in driving sustained adoption. This refined model not only advances our comprehension of e-government technology adoption but also provides a comprehensive framework for policymakers and service managers seeking to enhance public service delivery and citizens' quality of life, through more user-centric and technologically-advanced e-government systems.

4.8. Chapter Summary

This chapter delved into the factors that influence the acceptance and utilization of the NaTIS platform, focusing on its significance during the challenging circumstances of the COVID-19 pandemic in SA. The analysis yielded crucial insights aimed at improving user-engagement with NaTIS and ensuring its continued adoption. In the

process, various factors aligned with the conceptual framework were explored, which yielded significant insights. It was established that the relationship between performance expectancy and facilitating conditions testify that aligning NaTIS with user expectations can significantly enhance its perceived relatedness, a key driver of user engagement. Furthermore, effort expectancy emerged as a significant influence on user behaviour. A user-friendly, streamlined experience significantly impacts users' actions, highlighting that an effortless, intuitive system encourages users to continue using NaTIS, therefore, simplifying user interactions, providing intuitive navigation, and minimizing complexity within the NaTIS website is imperative. Facilitating conditions, particularly during times of crisis, were found to be crucial for user adoption. Access to necessary resources and support is vital in users' decision-making with NaTIS, therefore, improving facilitating conditions can increase system usage, making it easier for users to access and utilize the system. The perception of relatedness during crises, such as the COVID-19 pandemic, emerged as a key driver of adoption. Users' perception of the system's relevance to their needs and interests significantly impacts their motivation to use NaTIS, thus, enhancing perceived relatedness is particularly essential during challenging times when users seek information that directly impacts their safety and well-being. The results demonstrate that some citizens have never used the systems, however, the findings further reveal that social factors strongly influence user-behavioural intentions, particularly during crises, therefore, acknowledging this social influence is critical for promoting user engagement with the system during challenging periods. Furthermore, the regression analysis and hypothesis-testing results indicate the significance of these factors in influencing users' behavioural intentions regarding NaTIS. Performance Expectancy, Effort Expectancy, Facilitating Conditions, and Perceived Relatedness all played essential roles in shaping user intentions, highlighting their essential role in the system's success. By enhancing these key factors, NaTIS can better serve its users, ensuring its continued success in providing essential traffic-information services in SA. This proactive approach could ensure that NaTIS remains a reliable resource, especially in times of uncertainty and challenges.

CHAPTER 5: DISCUSSION AND RECOMMENDATIONS

5.1. Introduction

The preceding chapter presented the analysis and discussion of findings related to citizens' adoption and utilization of the NaTIS during unfavourable occasions like the Covid-19 pandemic in SA. The focus in this chapter shifts towards drawing meaningful conclusions and providing relevant recommendations. These conclusions and recommendations will be essential for policymakers, government officials, and stakeholders involved in the NaTIS and its utilization by citizens.

5.2. Aim of the study

This study aimed to investigate citizens' adoption and use of NaTIS during adverse times like pandemics and propose a framework to guide the government in ensuring the widespread acceptance and use of NaTIS services in SA.

5.3. Discussion of the findings

The outbreak of the Covid-19 pandemic underscored the importance of strengthening online systems, including the NaTIS. Educational institutions' shift to online platforms provided citizens with opportunities to enhance their computer literacy skills, which is essential for efficiently utilizing NaTIS services. The research found a high level of e-government awareness among citizens, indicating a promising inclination to accept and utilize NaTIS services. Despite varying levels of prior e-government experience, citizens demonstrated proficiency in computer literacy, positioning them favourably for NaTIS utilization with proper guidance and motivation.

These findings highlight the changing landscape of NaTIS usage, in response to external factors, setting the stage for a deeper exploration of user perceptions and behaviours.

5.3.1. NaTIS Users

It has been established that various key factors significantly influence the acceptance and usage of the NaTIS, namely, performance expectancy, effort expectancy, facilitating conditions, perceived relatedness, and actual usage and continuous use.

Performance Expectancy

The findings related to performance expectancy reveal several key themes that influence citizens' acceptance and utilization. Various scholars, such as Rose et al., (2015) and Mark (2017), concluded that the accessibility, speed, and reliability of an online system, including the NaTIS, play a crucial role in garnering user-trust and satisfaction. Users perceive NaTIS as an accessible, fast, time-saving, and reliable platform, contributing positively to its widespread acceptance. Additionally, user-friendliness and convenience are highlighted as key factors in promoting acceptance and encouraging continuous use; these points align with prior studies that underscore the importance of user-centred design in technology adoption (Nam, 2014).

Positive feedback and word-of-mouth recommendations from users, particularly within the context of driving schools, further enhance NaTIS's reputation and contribute to its acceptance. It is, however, crucial to also address limitations, such as the system’s inability to amend bookings immediately, as identified by a minority of users, as these issues can hinder widespread acceptance.

Effort Expectancy

Examining effort expectancy, a pivotal factor in the acceptance and utilization of the NaTIS, uncovered significant themes that resonate with prior studies and have implications for user-adoption. Kyem (2016) and Cloete (2012) argue that user's perception of the ease of use and overall convenience play a central role in shaping their acceptance and continuous utilization of a system. Most citizens were positive regarding the user-friendliness and ease of interaction with NaTIS, which indicate the importance of these aspects in fostering a favourable attitude and intention to adopt the technology, however, it is crucial to also address specific limitations users encounter, such as insufficient error feedback and technical issues, as these constraints can impede widespread acceptance. The findings further outlined the need to clarify the NaTIS convenience and user-benefits.

Facilitating Conditions

The facilitating conditions factor highlights the various elements influencing citizens' interaction with the NaTIS platform. It is evident that internet access in public places, work and home, significantly facilitates NaTIS utilization. A notable proportion of users believed they had adequate internet connectivity at their locations, enhancing the

accessibility of NaTIS services. In addition, public internet access further supports users' ability to engage with NaTIS, however, various concerns still need to be addressed, particularly regarding the insufficiency of the FAQ page and the absence of chat support, which users find valuable for resolving queries promptly.

Certain users have encountered quick responses to query from NaTIS, they still believe they need more satisfactory solutions, suggesting the need to improve technical support. Furthermore, issues with the NaTIS platform's functionality emerged, such as the removing of the option "reprint vehicle license" renewal requests, stressing the need to consider user preferences and convenience. These findings underscore the significance of addressing these issues to enhance the NaTIS user experience and promote its widespread acceptance and utilization.

Perceived Relatedness

The findings related to the perceived relatedness factor shed light on how timely support and assistance from NaTIS consultants influence users' comfort level, confidence in query resolution, and overall motivation to use the NaTIS website. In line with prior research by Smith et al., (2018) which investigated the importance of user support in promoting technology acceptance, most users (78%) reported feeling more comfortable using the NaTIS website when they received timely support from NaTIS consultants. This highlights the key role of prompt assistance in enhancing citizens' comfort and confidence when utilizing the platform and although some users complained about the query-resolving issues, most users expressed comfort in logging queries on the NaTIS website, driven by their confidence that these queries will be effectively resolved. This trust in the system's ability to address and resolve queries aligns with the findings of prior studies (Chen et al., 2016). This finding underscores the significance of providing users with effective query-resolution mechanisms.

Venkatesh et al., (2012) highlights the importance of online support in user-navigation and platform-engagement. This perception of helpful guidance aligns with the findings that online support resources, such as timely support, were perceived positively by most users (83%) in terms of providing adequate guidance for navigating the NaTIS website. In addition, most users perceive the NaTIS consultants as valuable in providing effective guidance and facilitating task completion, aligning with prior

research highlighting the critical function of user-support personnel (Liu et al., 2020). Furthermore, Li et al., (2019) underscores the role of support services in encouraging users to engage with the platform more actively. This positive influence on motivation is also supported by most users who reported that support from NaTIS consultants increases motivation to use the NaTIS website.

Actual Usage & Continuous Use of the NaTIS

Studies done by Venkatesh et al., (2003) and Dwivedi et al., (2019) attest that user-friendliness of an online system and robust support mechanisms, play key roles in driving technology acceptance. In support of this perception, the findings revealed that most users believe that the NaTIS information is well-structured and that the support provided is sufficient. This asserts the need for maintaining the quality of information and support services on the NaTIS platform to ensure citizens can easily access the resources they need to navigate the system effectively, improving their confidence in using it. Most users showed confidence in using the NaTIS website correctly, showing that most citizens have acquired the necessary skills and knowledge to navigate and interact with the platform effectively. These findings align with prior studies highlighting the significance of use-confidence in technology usage (Venkatesh et al., 2012). Additionally, a notable % of users (84%) expressed their willingness to consume the NaTIS services continuously, emphasizing the importance of users' intention to continue using technology (Bhattacherjee, 2001).

5.3.2. Non-NaTIS Users

In examining the findings of non-NaTIS users, in aiming to identify potential barriers to entry and strategies to promote acceptance among this group of citizens, various factors, such as technology adaptability and working experience, were deemed key determinants.

Venkatesh et al., (2020) assert adaptability to new technologies as a key determinant in influencing technology adoption. Citizens who are open and adaptable to new technologies tend to be more willing to embrace and experiment with unexplored digital systems. Most citizens considered themselves ‘good to excellent’ at adapting to new technologies, which reflects a positive indicator for the potential adoption of NaTIS. Furthermore, it was established that most users possess computer literacy

skills and adaptability to new technologies ranging from ‘average to exceptional’ (more than 62%). These findings suggest that many citizens, not currently using the NaTIS are highly adaptable to new technologies, which is a good indicator for adopting the NaTIS, as individuals who readily embrace change and innovation can play a crucial role in facilitating the introduction of new systems. In line with the study done by Venkatesh et al., (2020), working experience also plays a crucial role in technology adoption as individuals with more extensive work experience tend to be more aware of the benefits of new technologies. The findings revealed that most citizens who had no working experience had also never interacted with an e-government system. This suggests they require extensive training and support to adapt to the NaTIS system, however, a considerable percentage (11%) with a few years of working experience could adopt the NaTIS more smoothly.

Various themes emerged when examining citizens' reasons for not using NaTIS, which are in line with recent e-government systems adoption studies. This includes a lack of awareness, highlighted as a barrier in a recent study by Al-Hujran et al., (2015), and trust issues, highlighted as a significant hindrance to e-government adoption by Dwivedi et al., (2019). Furthermore, only some citizens had preferences for in-person interactions at traffic stations as is evident in studies by Alomari et al., (2020) and Munyoka (2020), who assert that some individuals still prefer traditional offline channels for government services. Some citizens had concerns about the usability and appeal of the NaTIS system, and these concerns are in line with findings by Venkatesh et al., (2020), which stress user-friendliness and user-experience in technology adoption.

Social Influence

The findings related to the social influence factor illustrate the critical role of interpersonal connections and public-marketing campaigns in shaping citizens' willingness to adopt and use the NaTIS. The current findings established that most citizens are positively influenced by advice from people important to them, familiar with them, and public-marketing campaigns. Venkatesh et al., (2020) and Dwivedi et al., (2019) state that social networks and interpersonal relationships are key to technology adoption. These findings suggest that leveraging social networks and positive

recommendations from important individuals can be powerful strategies for promoting NaTIS adoption.

Ease of Use and Assistance

It has been established that various themes, such as user-interface friendliness and assistance, play an essential role in citizens' intentions to adopt the NaTIS website. Most citizens were positive about using the NaTIS, if a built-in help guide was provided, supporting the inclusion of user-friendly assistance features. Most participants were willing to adopt the NaTIS if they - had seen other people using it, had people to assist them, had social influence, and had people to call for help. This positive perception aligns with previous studies done by Dwivedi et al., (2019), highlighting the role of human assistance in improving users' experience and reducing barriers to adopting technology. Dwivedi et al., (2019) had asserted the urgency of user-friendly assistance options and the need for clear and accessible help features.

5.4. Reflections on the Research Questions

Research Questions	Discussion
RQ1: How are citizens currently accessing the National Department of Transport services in South Africa?	The study comprehensively assessed citizens' access to NaTIS services, involving various factors such as availability, experiences with online support, and usage of traditional methods among non-NaTIS users.
RQ2: What are the acceptance and utilization levels of the NaTIS by citizens?	The study comprehensively analysed citizens' acceptance and utilization of NaTIS services, considering factors influencing adoption and continuous usage.
RQ3: How can the challenges faced by citizens when accessing the NaTIS system be resolved?	Identified challenges include insufficient FAQs, technical issues, and application status tracking. Recommendations focus on addressing these issues to enhance service quality and accessibility.
RQ4: What could be done to ensure the widespread	Recommendations include general enhancements, user-friendly design, built-in help guides, self-service options,

adoption and use of the NaTIS by citizens?	highlighting user stories, user education, leveraging social networks, and user training.

5.5. Contributions of the study

This research contributes significantly to the field of e-government applications and public service delivery as it comprehensively explored the dynamics underlying citizens' engagement with the National Department of Transport services in SA, particularly, the NaTIS.

5.5.1. Empirical Understanding, Acceptance and Utilization of NaTIS

The study results provide an empirically-grounded understanding of how citizens currently access and utilize NaTIS services, filling a crucial gap in the literature. The findings offer detailed insights into the prevailing engagement patterns, addressing the "how" aspect of citizen interactions with e-government platforms. In addition, the study explores SA citizens' views and behaviours towards acceptance and utilization of NaTIS; as a result, the findings advance the knowledge base on the factors affecting the widespread adoption of such platforms.

Through the comprehensive analysis done on challenges faced by citizens when accessing NaTIS, this study identified not only limitations but also relevant valuable recommendations for their resolution. These recommendations aim to improve the service quality, accessibility, and overall experience for citizens, thereby, providing valuable insights, also, for future research.

5.5.2. Methodological Contribution

This study advanced methodological research by integrating quantitative and qualitative methods to understand citizen engagement with e-government services, comprehensively. The use of Likert scale data and thematic analysis, combined with factor analysis and regression, resulted in methodological robustness.

5.5.3. Policy and Service Enhancement Importance

The research outcomes offer valuable guidance for policymakers, public service managers, and technology developers so as to transform public services into more

citizen-centric and technologically-sophisticated models. The recommendations and insights present actionable strategies for enhancing NaTIS and other e-government systems, to ensure improved service delivery quality and citizens' lives.

5.6. Recommendations

Considering the research findings and insights regarding factors influencing NaTIS adoption, the following recommendations are presented to enhance the adoption and utilization of the NaTIS website.

5.6.1. General NaTIS Enhancements

Address reported technical issues promptly, including login problems and content clarity.

When clients are not patient with technical issues associated with systems, they are more likely to abandon them due to technical glitches or frustration, therefore, reported issues, such as login problems, content clarity, and limitations should be addressed timelessly.

Implement regular system updates to improve performance and user satisfaction.

The NaTIS system should be updated with the latest technological advancements and user-interface best practices. As a basic rule of the thumb, regular system updates can improve system performance and user satisfaction around concerns such as complaints about the inability to amend or cancel bookings immediately, therefore, implementing solutions that allow quicker and more user-friendly booking adjustments could play a vital role in retaining users.

Reintroduce removed functionality, such as reprinting options, and implement application status tracking features.

Citizens have raised concerns about removed functionality for reprinting options deemed important to them. Reintroducing these options, for instance, to reprint vehicle license renewal requests, could be a great idea as it will provide flexibility and an alternative method for promoting convenience and accommodating various preferences. In addition, users reported issues with application status tracking. This

functionality should be implemented as it enables citizens to monitor the progress of their applications and transactions easily.

5.6.2. User-Friendly Design

Continuously improve the user interface and overall design of the NaTIS platform.

One of the key determinants of technology adoption and acceptance is its interface design, therefore, it is necessary to constantly improve the user-interface and overall design of the NaTIS platform to ensure it is user-friendly and intuitive.

Conduct regular usability testing to identify and address usability issues effectively.

In addition, testing is the key component to maintaining the quality of a system, therefore, the NaTIS should prioritize user-interface improvements. This includes optimizing the navigation structure, enhancing content clarity, and ensuring a seamless user-experience, thus, regular usability testing to identify and address any usability issues could effectively inform these enhancements.

5.6.3. Built-in Help Guide and Self-Service Options

Develop a comprehensive assistance feature within the website, providing step-by-step guidance on using different aspects of the system.

Given that most respondents had a positive perception of a built-in help guide, developing and implementing a more comprehensive assistance feature, within the website, could improve their adoption and acceptance of the NaTIS. This feature should provide step-by-step guidance on using different aspects of the system.

Introduce chat support for immediate assistance and self-service machines at DLTCs.

Most citizens showed interest in various assistance options, hence, in addition to the existing helpline method, introducing chat support, which enables users to chat with a robot agent and can transfer the user to a human agent if unsatisfied with the solutions provided, could improve overall user-experience and confidence in using the NaTIS.

Some respondents advocated installing self-service machines at DLTCs to assist individuals who may not have access to computers, smartphones, or the Internet.

These machines can provide an alternative means for users to access NaTIS services, thereby, catering to a broader user-base.

Most citizens complained about needing more information than is on the NaTIS FAQs. Expanding this facility's content to cover a broader range of queries and regularly updating it to address common queries and concerns while ensuring that the information provided is clear, comprehensive, and user-friendly, could improve overall user-experience.

5.6.4. Highlight User Stories and Feedback Mechanism

Showcase positive user experiences through testimonials or user-generated content to encourage new users.

To influence citizens doubtful about NaTIS adoption, could be done by showcasing positive user experiences through various popular ways that are friendly to citizens, such as testimonials or user-generated content that demonstrate how others have effectively used the NaTIS to encourage new users and address concerns about its usability. These real-life examples would efficiently provide compelling evidence of the usefulness and ease of use.

Implement a feedback mechanism within the NaTIS platform for users to report glitches or issues.

Moreover, like any other system, NaTIS users can experience issues obtaining their services now and then, such as reported poor error feedback. Implementing a feedback mechanism within the NaTIS platform, where users can report glitches, issues, or difficulties, could reduce frustration and improve the overall user experience and the system's continual usability.

5.6.5. User Education and Awareness

Provide detailed information about NaTIS features, benefits, and how it improves citizens' lives through information campaigns.

Most of the respondents were either in agreement or disagreement with the questions/statements asked on this point, however, certain respondents remained uncertain about the questions, such as uncertainty about whether pieces of advice

received from people are important to them regarding NaTIS; it is therefore crucial to provide additional information and support. For example, provide citizens with detailed information about the NaTIS, including its features, benefits, and how it will improve their lives, which can help citizens understand the value of adopting the NaTIS. This can be achieved by creating information campaigns that address common concerns and misconceptions to boost users' confidence in adopting NaTIS.

Invest in effective marketing efforts to communicate NaTIS benefits clearly.

Most citizens indicated that public-marketing campaigns encouraged them to use the NaTIS, hence, continual investment in effective marketing efforts while ensuring that marketing materials clearly communicate the benefits and functionalities of NaTIS, could be advantageous in addressing any doubts potential users may have.

5.6.6. Leverage Social Networks

Utilize social networks and referral programs to promote NaTIS adoption among citizens.

Most respondents indicated that people important to them encourage them to use the NaTIS platform, therefore, authorities should utilize this strategy and social networks for promotional purposes - implementation of referral programs or incentives that encourage current NaTIS users to invite others to join.

5.6.7. User Training

Offer comprehensive user training programs or tutorials, especially for users with low computer skills, to bridge the digital divide.

The most effective way to ensure that people use the system as intended is by equipping those users with the necessary training and additional information, such as providing user-guides for agents and clients who access the NaTIS services. This could include developing an onboarding process for new users that guides them through the key features and functionalities of NaTIS. Offering these comprehensive user training programs or tutorials, especially those with low or no computer skills, could effectively break the barrier between them and adopting the NaTIS. These programs can help bridge the digital divide and enable a wider range of citizens to use the NaTIS comfortably.

5.7. Limitations to the study

While this study has provided valuable insights into the factors influencing the adoption of the NaTIS website, it is important to acknowledge the following limitations. The collected data relied on self-reported responses from participants, which may be subject to response bias or inaccuracies. Furthermore, the study employed a cross-sectional design, which captures data at a single point in time. This limits the ability to track changes in attitudes and behaviours over time, as opposed to longitudinal research that offers a more comprehensive understanding of changes in adoption and acceptance over time.

While this study incorporated quantitative and qualitative data, the qualitative data was only limited to comments, therefore, a more in-depth qualitative analysis could provide richer insights into users' experiences and perceptions towards factors influencing NaTIS adoption.

In addition, the researcher had difficulties accessing or obtaining data directly from the NaTIS, therefore, the researcher only relied on indirect methods - surveys, or self-reported data from users - which may have yet to capture the full range of user behaviours and experiences. As a result, this restricted the study’s ability to answer certain research questions, comprehensively.

5.8. Suggestions for future work

A longitudinal study can be conducted to track changes in user behaviour and perceptions over time, focusing more on a qualitative approach to provide insights into the long-term adoption and acceptance of the NaTIS system and how it can evolve alongside technological advancements. Lack of access to data from NaTIS, could be remedied through seeking opportunities for collaboration or partnership with relevant authorities or NaTIS to gain access to real-time and more comprehensive data. Researchers could also conduct an in-depth investigation into why non-NaTIS users are unwilling to adopt the system, thereafter, develop strategies to overcome these barriers and encourage adoption among this group.

5.9. Conclusion

In conclusion, this comprehensive study sheds light on the intricacies of citizens' engagement with the National Department of Transport Services in SA, specifically focusing on the NaTIS system. The research has yielded a substantial volume of empirical data and insights that contribute substantially to e-government's applications and the delivery of public services. One of the key findings of this study is the importance of user-friendliness and robust support mechanisms in driving technology acceptance. Citizens' perception of the NaTIS as a well-structured platform with sufficient support services highlights the need for maintaining the quality of information and support to ensure that citizens can easily access the resources they need, boosting their confidence in using the system effectively.

Furthermore, the study identified key determinants of technology adoption, such as adaptability to new technologies and working experience. These factors play a crucial role in influencing citizens' willingness to embrace and experiment with digital systems like NaTIS. Challenges faced by non-NaTIS users, including issues related to awareness, trust, and preferences for in-person interactions, indicates the urgency of addressing these barriers and tailoring strategies to promote acceptance among this group of citizens. The findings align with prior studies which had focused on the significance of user confidence, user-friendliness, and user experience in technology adoption.

The study highlights the importance of user-friendly design and assistance features on systems within e-government. Citizens express a strong inclination towards using NaTIS, if built-in help guides are provided and if they have people to assist them. This emphasizes the need for clear, accessible help features and the crucial nature of human assistance in improving the user experience. Concerning reflecting on the research questions, the study provides a comprehensive understanding of how citizens access NaTIS services, their levels of acceptance and utilization, the challenges they face, and strategies to promote widespread adoption. The research, therefore, offers valuable insights for policymakers, public service managers, and technology developers, aiming to make public services more citizen-centric and technologically sophisticated.

In order to promote NaTIS adoption, the study recommends general enhancements, user-friendly design, built-in help guides, self-service options, highlighting users' stories and feedback mechanisms, user education and awareness, leveraging social networks, and user training. These recommendations address technical issues, user interface design, assistance features, user confidence, and user education. While the study provides valuable insights, it also has limitations, including reliance on self-reported data, cross-sectional design, and limited access to real-time NaTIS data. Future research should consider longitudinal studies, in-depth qualitative analysis, broader contexts, and collaboration with relevant authorities for more comprehensive data.

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APPENDICES

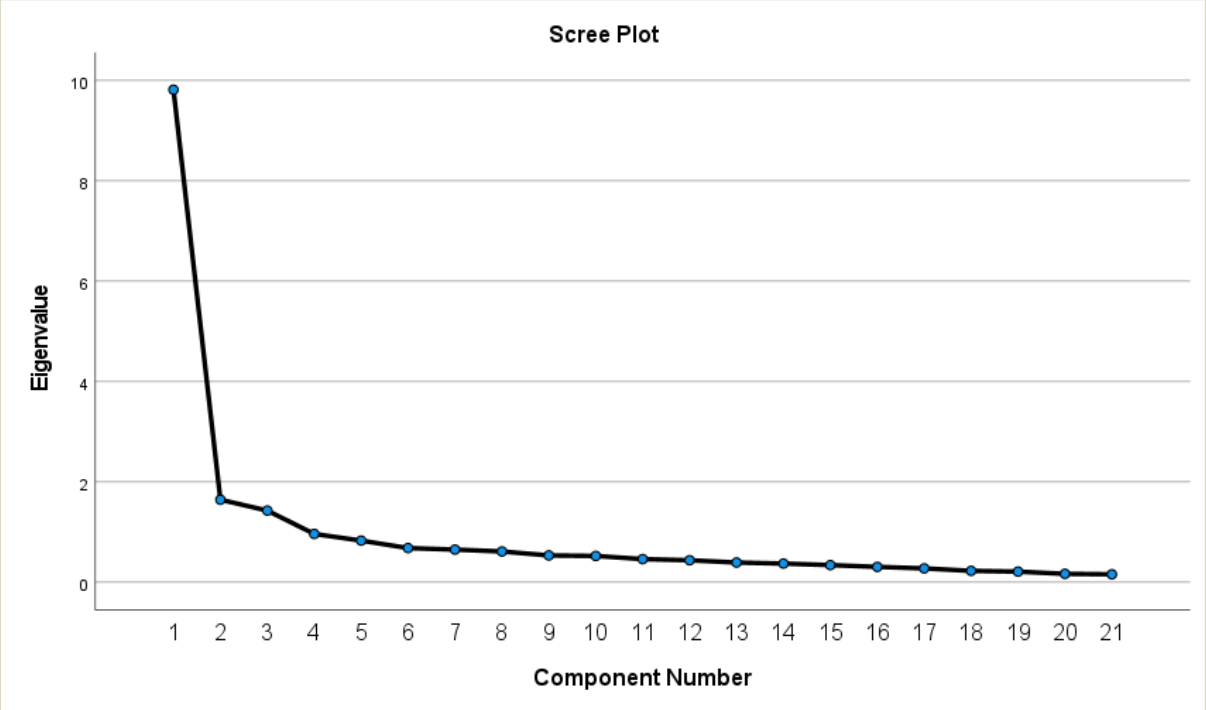
Appendix 1: Correlation Matrix

Correlation Matrix[a]

		PE1	PE2	PE3	EE1	EE2	EE3	EE4	FC1	FC2	FC3	FC4	FC5	FC6	PR1	PR2	PR3	PR4	PR5	AU&CU1	AU&CU2	AU&CU3
Correlation	PE1	1.000	.636	.601	.545	.372	.482	.401	.347	.245	.293	.186	.385	.261	.421	.175	.319	.364	.230	.395	.387	.416
	PE2	.636	1.000	.534	.542	.334	.525	.429	.418	.374	.354	.299	.329	.231	.413	.191	.303	.395	.257	.469	.340	.411
	PE3	.601	.534	1.000	.611	.456	.570	.445	.503	.458	.477	.360	.440	.296	.451	.298	.361	.510	.471	.414	.506	.435
	EE1	.545	.542	.611	1.000	.550	.713	.533	.478	.570	.598	.502	.552	.420	.456	.307	.317	.570	.484	.475	.640	.446
	EE2	.372	.334	.456	.550	1.000	.538	.462	.562	.497	.416	.434	.432	.483	.435	.484	.292	.346	.421	.423	.487	.475
	EE3	.482	.525	.570	.713	.538	1.000	.587	.446	.535	.543	.471	.564	.376	.485	.316	.360	.433	.471	.416	.614	.415
	EE4	.401	.429	.445	.533	.462	.587	1.000	.441	.342	.356	.429	.422	.426	.567	.488	.517	.516	.378	.564	.510	.437
	FC1	.347	.418	.503	.478	.562	.446	.441	1.000	.508	.513	.277	.380	.353	.471	.285	.382	.329	.263	.411	.459	.496
	FC2	.245	.374	.458	.570	.497	.535	.342	.508	1.000	.534	.616	.463	.592	.382	.330	.315	.380	.486	.387	.504	.407
	FC3	.293	.354	.477	.598	.416	.543	.356	.513	.534	1.000	.515	.585	.390	.309	.383	.245	.372	.442	.343	.533	.459
	FC4	.186	.299	.360	.502	.434	.471	.429	.277	.616	.515	1.000	.640	.654	.270	.470	.331	.450	.556	.473	.503	.389
	FC5	.385	.329	.440	.552	.432	.564	.422	.380	.463	.585	.640	1.000	.417	.392	.368	.320	.451	.545	.435	.517	.394
	FC6	.261	.231	.296	.420	.483	.376	.426	.353	.592	.390	.654	.417	1.000	.300	.505	.407	.375	.497	.496	.482	.412
	PR1	.421	.413	.451	.456	.435	.485	.567	.471	.382	.309	.270	.392	.300	1.000	.491	.590	.501	.462	.410	.445	.431
	PR2	.175	.191	.298	.307	.484	.316	.488	.285	.330	.383	.470	.368	.505	.491	1.000	.542	.468	.581	.519	.429	.410
	PR3	.319	.303	.361	.317	.292	.360	.517	.382	.315	.245	.331	.320	.407	.590	.542	1.000	.514	.460	.475	.326	.436
	PR4	.364	.395	.510	.570	.346	.433	.516	.329	.380	.372	.450	.451	.375	.501	.468	.514	1.000	.536	.462	.421	.416
	PR5	.230	.257	.471	.484	.421	.471	.378	.263	.486	.442	.556	.545	.497	.462	.581	.460	.536	1.000	.396	.517	.362
	AU&CU1	.395	.469	.414	.475	.423	.416	.564	.411	.387	.343	.473	.435	.496	.410	.519	.475	.462	.396	1.000	.406	.493
	AU&CU2	.387	.340	.506	.640	.487	.614	.510	.459	.504	.533	.503	.517	.482	.445	.429	.326	.421	.517	.406	1.000	.499
	AU&CU3	.416	.411	.435	.446	.475	.415	.437	.496	.407	.459	.389	.394	.412	.431	.410	.436	.416	.362	.493	.499	1.000
Sig. (1-tailed)	PE1		<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	.008	<.001	<.001	<.001	.012	<.001	<.001	.001	<.001	<.001	<.001
	PE2	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.000	.007	.000	.000	.000	.000	.000	.000
	PE3	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	EE1	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	EE2	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	EE3	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	EE4	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	FC1	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	FC2	.001	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	FC3	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000
	FC4	.008	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	FC5	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000
	FC6	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000
	PR1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000
	PR2	.012	.007	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000
	PR3	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000
	PR4	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000
	PR5	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000
	AU&CU1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000
	AU&CU2	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000
	AU&CU3	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	

a. Determinant = 1.381E-6

Appendix 2: Scree Plot



Appendix 3: Work Plan

	DATES																																	
ACTIVITIES	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
	2021												2022												2023											
Consultation with the supervisor																																				
Writing proposal																																				
Submission of proposal																																				
Proposal presentation and correction																																				
Chapter 2 writing and submission																																				
Chapter 3 writing and submission																																				
Waiting for Ethical Clearance certificate																																				
Data Collection																																				
Data analysis																																				
Interpretation and Result																																				
Submission of the Study																																				
Correction																																				
Final Submission																																				

Appendix 4: Ethical Clearance Letter

ETHICS APPROVAL CERTIFICATE

RESEARCH AND INNOVATION
OFFICE OF THE DIRECTOR

NAME OF RESEARCHER/INVESTIGATOR:
Mr TM Rambau

STUDENT NO:
16013051

PROJECT TITLE: **The adoption and use of the National Traffic Information System (NaTIS) by the citizens during the Covid-19 pandemic in South Africa.**

ETHICAL CLEARENCE NO: FMCL/22/BIS/19/2303

SUPERVISORS/ CO-RESEARCHERS/ CO-INVESTIGATORS

NAME	INSTITUTION & DEPARTMENT	ROLE
Dr. W Munyoka	UNIVEN, Business Information Systems	Supervisor
Mr MF Manzira	UNIVEN, Business Information Systems	Co-Supervisor
Mr TM Rambau	UNIVEN, Business Information Systems	Investigator – Student

Type: Masters Research
Risk: Minimal risk to humans, animals, or environment (Category 2)
Approval Period: March 2023 – March 2024

The Research Ethics Social Sciences Committee (RESSC) hereby approves your project as indicated above.

General Conditions
While this ethics approval is subject to all declarations, undertakings and agreements incorporated and signed in the application form, please note the following.

- The project leader (principal investigator) must report in the prescribed format to the REC:
  - Annually (or as otherwise requested) on the progress of the project, and upon completion of the project.
  - Within 48hrs in case of any adverse event (or any matter that interrupts sound ethical principles) during the course of the project.
  - Annually a number of projects may be randomly selected for an external audit.
- The approval applies strictly to the protocol as stipulated in the application form. Would any changes to the protocol be deemed necessary during the course of the project, the project leader must apply for approval of these changes at the REC. Would there be deviated from the project protocol without the necessary approval of such changes, the ethics approval is immediately and automatically forfeited.
- The date of approval indicates the first date that the project may be started. Would the project have to continue after the expiry date; a new application must be made to the REC and new approval received before or on the expiry date.
- In the interest of ethical responsibility, the REC retains the right to:
  - Request access to any information or data at any time during the course or after completion of the project,
  - To ask further questions; Seek additional information; Require further modification or monitor the conduct of your research or the informed consent process.
  - withdraw or postpone approval if:
  - Any unethical principles or practices of the project are revealed or suspected.
  - It becomes apparent that any relevant information was withheld from the REC or that information has been false or misrepresented.
  - The required annual report and reporting of adverse events was not done timely and accurately,
  - New institutional rules, national legislation or international conventions A it necessary

ISSUED BY:
UNIVERSITY OF VENDA, RESEARCH ETHICS COMMITTEE
Date Considered: February 2023

Name of the RESSC Chairperson of the Committee: Prof TS Mashau

Signature

University of Venda
PRIVATE BAG X5050, THOHOYANDOU, 0950, LIMPOPO PROVINCE, SOUTH AFRICA
TELEPHONE (015) 962 8504/8313 FAX (015) 962 9060
"A quality driven financially sustainable, rural-based Comprehensive University"

UNIVERSITY OF VENDA
OFFICE OF THE DIRECTOR
RESEARCH AND INNOVATION
2023 -03- 13
Private Bag X5050
Thohoyandou 0950

Appendix 5: Detailed budget

Item	Description	Amount
Assistance (Type) Data Analysis	Research assistant for data analysis@ R20 X 400 questionnaires	R 8000.00
Consumables (specify)	Stapler @R 159.99, USB @ R 100.00 X 3 1TB External hard drive @R 1400 Punch @ R100	R1960.00
Travelling Expenses (specify) (Approved tariffs = 3.61)	Thohoyandou Sibasa @ R17.00 X 10 Makhado @R202.00 X 10	R2190.00
Subsistence (specify)	Highlighter 4pk@R29.99, Pen Ballpoint X4 @R30, Copy paper 5XSingle pk. @R219.99, Book Bag @R34.99, Staples @R13.99/pk. MTN data bundles @R1000.00	R1329.00
Printing (specify)	Printing of questionnaires@ R3 per page X 400 X 7 pages Printing of final dissertation @R3 X 200 pages	R2800.00
Other (specify)	Proposal editing @ R30 X 45 pages Proof reading (Final research) @30 X 200 pages File for storage of 400 questionnaires @ R100 X 2 Spiral Binding @R 100 X 5 Copies Book binding (Final research) @R 380 X 5	R9950.00
Total	R 26 229.00	

Appendix 6: Participant Letter of Information and Consent Letter

PARTICIPANT LETTER OF INFORMATION

My name is **Rambau Thifhindulwi Maxwell**. I am a student at the University of Venda, doing Masters in the Department of Business Information Systems. I am conducting a study titled "**The adoption and use of the National Traffic Information System (NaTIS) by the citizens during the Covid-19 pandemic in South Africa**". This study aims to propose a framework that could be used to ensure a widespread adoption and use of NaTIS services by citizens in South Africa during pandemics like Covid-19. The enclosed questionnaire has been designed to collect information on the lived experiences of citizens during their efforts to access services at the national traffic stations and on the NaTIS.

Please note:

Ethical conditions and procedures will strictly be followed as your participation is voluntary and valuable to the success of this study. Also, note that this is academic research and that there are no financial rewards for participation. Should you feel that you are unable to continue, you may withdraw at any time. The data being collected is anonymous and will be treated with a high degree of confidentiality. All data being collected contributes towards the write-up of the final dissertation.

If you agree to participate, please answer the research questions on the questionnaire. The completion of the questionnaire should take approximately 15-20 minutes. Thank you for your assistance in this important endeavour.

If you have any concerns, feel free to contact me or my research supervisor using the details bellow:

Researcher name: Rambau Thifhindulwi Maxwell
Email: mindsetrambau@gmail.com
Phone: +27 65 605 7482

Research Supervisor: Dr W. Munyoka
Email: Willard.munyoka@univen.ac.za

Research Co-Supervisor: Mr D. Tutani
Email: Donald.tutani@univen.ac.za

Appendix 7: CONSENT LETTER

Statement of Agreement to Participate in the Research Study:

- I……hereby confirm that I have been informed by the researcher, **Rambau Thifhindulwi Maxwell**, about the nature, conduct, benefits, and risks of this study - Research Ethics Clearance Number:
- I have also received, read, and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my gender, age and level of education will be anonymously processed in the dissertation.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerized system by the researcher.
- I am free at any stage, without prejudice, to withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during this research which may relate to my participation will be made available to me on request.

Full Name of Participant Date Time Signature

I, …….. …… …… ……..
Rambau Thifhindulwi Maxwell, herewith confirm that the above participant has been fully Informed about the nature, conduct and risks of the above study.

Full Name of Researcher …… Date…….

Signature……

Appendix 8: Research Questionnaire

Please answer the questions under section A, Section B (Part one and four) by putting a cross (X) next to relevant answer.

Section A – Demographic Information

1. What is your gender?

Male		Female	

2. What is your age group?

17 – 26	
27 – 36	
37 – 46	
47 – 56	
57 and above	

3. What is your highest qualification?

Matric	
Diploma	
Degree	
Post-graduate	
None	

4. What is the level of your computer literacy skills?
(Where: 1 = very low; 2 = low; 3 = average; 4 = good; 5 = excellent)

Level	1	2	3	4	5

Section B : E-Government, NaTIS system Usage and Effective Use

PART ONE: E-Government

This part of the questionnaire is intended to understand your knowledge of e-government and its benefits. Services available on the https://online.natis.gov.za/ include driver's license registration, tariffs payment, etc. This study particularly focuses on citizens' use and of this website and its effectiveness.

5. Are you familiar with the e-government concept?

YES		NO	

6. If YES, are you aware of the benefits of e-government?

YES		NO	

7. How many years of experience do you have in using the e-government application/services?

2 years or less	
2 – 5 Years	
5 or more	
No experience	

PART TWO: NaTIS Usage and Effective Use

This part of the questionnaire is intended to obtain the respondent's use and experience of the https://online.natis.gov.za/ website. Services available on the https://online.natis.gov.za/ include driver's license registration, tariffs payment, etc. This study particularly focuses on citizens' use and effective use of this website.

8. I use the https://online.natis.gov.za/ website:

Daily	
At least once a week	
Once a month	
Rarely or hardly ever	
I have never used it	

9. I have been using the NaTIS website:

Less than 1 year	
Between 1 and 5 years	
More than 5 years	

PART THREE: NaTIS Usage and Effective Use

This part of the questionnaire is intended to understand how well respondents use the https://online.natis.gov.za/ website, its potential benefits and challenges encountered during their effort to access the services.

In this section, please indicate your level of agreement/disagreement with the following statements

(*Where: SD-Strongly Disagree, D-Disagree, N-Neutral, A-Agree, SA-Strongly Agree*.)

PERFORMANCE EXPECTANCY

Number	Statement	SD	D	N	A	SA
10	I visit the NaTIS website whenever I need specific information or to access national traffic services.					
11	Using the NaTIS website saves my time and cost.					
12	The NaTIS website allows me to use it anywhere.					

Any comments you would like to share regarding performance expectancy?

EFFORT EXPECTANCY

Number	Statement	SD	D	N	A	SA
13	Becoming skillful at using the NaTIS website is easy for me.					
14	The content on the NaTIS website is clear and understandable					
15	Interaction with the NaTIS website is easy for me.					

Any comments you would like to share regarding effort expectancy?

FACILITATING CONDITIONS

Number	Statement	SD	D	N	A	SA
16	My internet access at work enables me to use the https://online.natis.gov.za/ website.					
17	My internet access at home enables me to use the https://online.natis.gov.za/ website.					
18	My internet access at public places enables me to use the https://online.natis.gov.za/ website.					
19	My online support enables me to use the https://online.natis.gov.za/ website to help resolve my queries.					
20	My queries get resolved quickly and satisfactorily when I log it on the https://online.natis.gov.za/ website.					
21	The Frequently Asked Questions (FAQ) site available on the https://online.natis.gov.za/ website helps me to easily use the website.					

Any comments you would like to share regarding facilitating conditions?

PERCEIVED RELATEDNESS

Number	Statement	SD	D	N	A	SA
22	I feel more comfortable in using the https://online.natis.gov.za/ website when support is provided timely by the NaTIS consultant.					
23	I feel comfortable logging my queries on the https://online.natis.gov.za/ website because I am confident that they will be resolved.					
24	The online support on the https://online.natis.gov.za/ website gives me enough guidance on how to navigate the website.					
25	I found the NaTIS consultant helpful in completing my tasks on the https://online.natis.gov.za/ website.					
26	The support I have received from the online NaTIS consultant has increased my motivation to use the https://online.natis.gov.za/ website.					

Any comments you would like to share regarding perceived relatedness?

CONTINUOUS USAGE

Number	Statement	SD	D	N	A	SA
27	The NaTIS website is set up to provide me with enough information and support I need.					
28	I believe I am using the NaTIS website correctly.					
29	I would like to use the NaTIS website frequently.					

Any comments you would like to share regarding actual usage?

PART FOUR: NaTIS system non-Users

This part of the questionnaire is intended for respondents with no experience of using the https://online.natis.gov.za/ website.

30. What is the level of your adaptability to new technologies?
(Where: 1 = very low; 2 = low; 3 = average; 4 = good; 5 = excellent)

Level	1	2	3	4	5

31. How many years of working experience do you have?

2 years or less	
2 – 5 Years	
5 or more	
No experience	

32. Please elaborate on your non-usage of the https://online.natis.gov.za/ website. (Please select all that applies)

I have never heard of it before.	
I do not trust the application.	
Not all services I need are available.	
I don't know which services I would be able to use via the website	
Always receiving error message -	
I prefer going to the offices	
It is not appealing and attractive to the eyes	
Never really thought of using it	

Other (specify)

SOCIAL INFLUENCE

Number	Statement	SD	D	N	A	SA
33	People who are important to me think that I should use the https://online.natis.gov.za/ website.					
34	People who are familiar with me think that I should use https://online.natis.gov.za/ website.					
35	The public marketing campaigns have influenced me to use the https://online.natis.gov.za/ website.					
36	Most people surrounding me use the https://online.natis.gov.za/ website.					

Any comments you would like to share regarding social influence?

BEHAVOURAL INTENTION TO USE NaTIS

Number	Statement	SD	D	N	A	SA
37	I could use https://online.natis.gov.za/ website if I had the built-in guidance for assistance.					
38	I could use https://online.natis.gov.za/ website if someone showed me how to do it.					
39	I could use https://online.natis.gov.za/ website if I had seen someone else using it.					
40	I could use https://online.natis.gov.za/ website if I could call someone for help.					
41	I could use https://online.natis.gov.za/ website if I had the built-in help facility for assistance.					

Any comments you would like to share regarding intention to use the NaTIS?

THANK YOU FOR PARTICIPATING IN THIS STUDY!