The Effect of Digital Nudging on the Users of E-commerce Websites in South Africa

Dissertation presented to the Department of Information Systems

University of Cape Town

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In partial fulfilment of the requirements for the Master's Degree specializing in Information Systems

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August 2024

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Dedication

I am immensely grateful to my creator, Jesu Kristu (*Mwari Ngaakudzwe)* for providing me with the opportunity to attend the University of Cape Town during this Master's degree and sustaining me throughout every endeavor.

I would like to express my sincere gratitude to my late mother, my sisters, my uncles & aunts the rest of my family, friends and colleagues. Thank you for your support and guidance throughout this journey, as well as enabling me to achieve my dreams.

A special mention to my sisters, Tau and Viji. Thank you for being there and encouraging me along the way.

Life continues to be an incredible journey,

Tapiwa Chihota
August 2024

Acknowledgement

I have the utmost gratitude to my supervisor Prof Adheesh Budree for his inspiration, support, patience and guidance through my research, may God bless you.

I would also like to thank all my professors in the Information Systems (IS) department for the exposure, encouragement and assistance throughout my master's studies. It has been a stressful but enlightening period within my life, and I would encourage anyone and everyone to seek knowledge through the various avenues which life presents.

It has been a pleasure.

Abstract

Post pandemic, online shopping applications have seen a rise in consumer traffic over the past three years. E-commerce sales have grown by 35% year over year, with online penetration remaining 30% higher than pre-Covid levels (McKinsey & Company, 2021). In South Africa, e-commerce is driven by high and fast-growing internet usage, pushing e-commerce growth from 27 million to 38 million by 2027.

Given the ubiquitous use of e-commerce applications, it has become increasingly important for e-retailers to optimize the design of their web stores to attract consumers and gain a competitive advantage. Usability concerns affect transactional websites (e-commerce), as they need to enable users to achieve their goals efficiently, effectively, and satisfactorily (Díaz et al., 2017). Many e-commerce applications have incorporated digital nudging techniques to change consumers' online choice environments and influence their purchase decisions.

This thesis aims to understand the effect of digital nudging on the users of e-commerce websites in South Africa. Specifically, this study investigates the effect of timed promotions, shipping information, and returns information nudging on customer response based on an experimental e-commerce platform. The responses were recorded using a questionnaire with a specific focus on three dependent variables to measure the customer responses between the nudge variants. Online experiments were conducted with the e-commerce clothing store "Superbalist" which is the second most popular e-commerce site in South Africa generating 220 million in annual revenue.

This study employed a one-way between - subjects ANOVA (Analysis of Variance), to analyze the quantitative data. The results of the study show that the individual digital nudges examined (timed promotions, shipping information, and returns information nudges) result in more positive customer responses to most of the variable questions than no nudging. Moreover, combination nudges created by combining individual nudge variants have shown interesting insights into the negative backfiring effect of having too many nudges, resulting in a less positive customer response than no nudging at all.

Keywords

Nudging; Digital nudging; Choice Architecture; User Experience Design; E-commerce,

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1. Introduction

Human decision-making is not always rational and can be influenced by heuristics and biases, (Thaler & Sunstein, 2008). In the e-commerce industry, customers face a vast array of choices that can lead to a decision-making paradox. Therefore, e-commerce managers and user experience designers are beginning to use nudges to influence customer choices (BusinessBalls, 2020; Mirsch et al., 2017; Weinmann et al., 2016). Behavioural science literature defines the nudge theory as a modern theory that seeks to understand how people think and make choices. The theory postulates that humans think in two distinct systems, System 1 and System 2, with System 1 being fast, intuitive, and unconscious, whereas System 2 is self-aware, controlled, and reflective (Thaler & Sunstein, 2016; Kahneman, 2015).

Research on digital nudges contributes to the understanding of individual choice behaviour when interacting with digital entities (Bammert et al., 2020). Digital nudging is the application of nudge theory to influence human decision-making in online environments, such as e-commerce websites and digital apps. However, little is known about the application of the nudge theory to digital contexts, such as websites and online shops (Mirsch et al., 2017; Weinmann et al., 2016). This study aimed to determine the effect of digital nudging on e-commerce customers in South Africa. This study is particularly relevant because the concept of online shopping has revolutionized how consumers shop globally (Rudansky-Kloppers, 2016), and there is a need to understand how online consumers behave (Fayad & Peper, 2015).

The frequency of online purchases varies from country to country, with South Africa being no exception (KPMG 2017). According to StatsSA (2017), the percentage of internet connectivity in South African households increased significantly between 2013 and 2016, from 40.9% to 59.3%. However, South African consumers remain cautious about online shopping, with a lack of trust being one of the factors hindering the growth of online shopping in the country (Mahlaka, 2016).

Given the South African e-commerce industry context, it is essential to identify which digital nudges affect customers, as previous studies have shown that nudges can provide both positive and negative results (Luo et al., 2019; Schneider et al., 2020). Therefore, this study investigates the effect of three chosen nudges on customer responses in an e-commerce environment in South Africa. More specifically, this study examines the effect of timed promotions, shipping information, and return information nudges on customer responses based on an experimental e-commerce platform. Customer behaviour insights in South Africa suggest that most returned items within the country were clothing, whereas 13 percent and

10 percent were shoes, and bags and accessories, respectively. Also, a strong, customer-centric e-commerce returns policy translates directly into a promise of satisfaction for them and more sales for the business. (Comalitcs.com.2023), this has motivated the choice of returns information as nudge. According to reports from OneDayOnly.co.za, discounts and deals are why 80% of consumers shop online. (Statista.com, 2023), this inspires the choice of the second nudge which is timed promotions. 70 percent of the respondents mentioned "direct delivery to my home" as the main driver for online purchasing, therefore, motivating the choice for shipping information as a nudge. The responses were recorded using a questionnaire that focused on three dependent variables to measure customer responses between the nudge variants.

This mini-thesis aims to fill this gap in the literature on digital nudging by investigating its effect on e-commerce customers in South Africa. The following sections provide a background and motivation for the study, research objectives and questions, the research method, and the scope and structure of the study.

1.1. Research Problem

Many e-commerce websites lose customers because of usability concerns regarding their platforms. Usability has a major role for transactional websites (e-commerce), as they need to enable users to achieve their goals efficiently, effectively, and satisfactorily (Díaz et al., 2017). The benefits of UX are two-fold: on one hand, design improves experience, and on the other hand, experience increases adoption (CareerFoundry, 2019). A good experience is likely to result in users returning to use the service and recommending it, which increases website traffic and conversion rate. (CareerFoundry, 2019.) Taking a more thoughtful approach in designing e-commerce websites will help improve customer experience.

In this study, out of the three selected nudges, the nudge, timed promotion was chosen for its potential in driving sales on ecommerce websites, however its absence might not have the same effect as the absence of the two nudges (shipping information and returns information). These two nudges may directly affect the customer experience on the e-commerce website in South Africa. For example, according to (bizzcomunity.com, 2023), fleets of delivery bakkies and scooters have changed the shape of fast-food and grocery retail since the pandemic, contributing to 40% growth in South African e-commerce in 2021 and 35% in 2022. Though delivery may not be the right fit for every retailer's customer base or business model, presence of delivery information helps to reduce online customer anxiety, builds trust, adds convenience and therefore, improving the overall customer brand perception and customer satisfaction which is crucial for business growth.

1.2. Purpose of the Study

Nudge theory suggests that subtle suggestions and cues can influence people's decision-making and behaviour. Mirsch et al.(2017) This theory has gained significant attention in recent years, particularly in the field of digital nudging, where it is used to design online shopping environments that encourage certain behaviours or choices. Individual decision behaviour while dealing with digital entities is better understood through research into digital nudges (Bammert et al. 2020).However, research in this area is still limited, particularly in the context of e-commerce websites in South Africa, which are experiencing a significant boom, Bigcommerce.com(2023).

This mini-thesis aims to fill this knowledge gap by examining the effect of digital nudging on e-commerce website users in South Africa. Specifically, it focuses on digital nudges, which are often presented on product pages. By understanding how these nudges influence customer behaviour, this mini-thesis hopes to provide insights that contribute to further academic research, nudge theory, especially digital nudging, has been proven as a viable behavioural economic theory, and it has lately attracted a growing amount of study attention (Mirsch et al. 2017; Schneider et al. 2018; Weinmann et al. 2016). The insights from this research can be used by user experience designers, e-commerce managers, and companies to design more effective websites and shops. Moreover, understanding the effect of digital nudges can empower users to make more rational decisions.

The study is exploratory in nature and examines the effect of three specific types of nudges on customer response. In doing so, it hopes to produce meaningful academic findings that can inspire other researchers to explore the topic of digital nudging in e-commerce. The implications of this research are also significant for business operatives, entrepreneurs, digital marketers, and product owners responsible for e-commerce platforms, as the nudges chosen for this study are widely used in many online shops in South Africa. Therefore, this research provides valuable insights that could be used to improve the effectiveness of these platforms and ultimately enhance user experience.

1.3. Research Question

This study investigates the effect of digital nudges on e-commerce website users in South Africa. E-commerce, or e-commerce, refers to the online purchase of goods or services. Specifically, the study focuses on three different digital nudges, namely, return information, shipping information, and timed promotions, which are commonly used in e-commerce platforms. By simulating a product page environment (using the Superbalist.com page) for questionnaire respondents, this study aims to identify the most effective nudge or combination of nudges in producing a positive customer response in South Africa. The research questions to be addressed are as follows

Research Question: What is the effect of digital nudges on online customers purchasing in South Africa?
Sub -question 1: what is the effect of digital nudge 1 (timed promotions nudge) on online customer purchasing in South Africa
Sub-question 2: What is the effect of digital nudge 2 (shipping information nudge) on online customer purchasing in South Africa
Sub-question 3: What is the effect of digital nudge 3 (returns information nudge) on online customer purchasing in South Africa
Sub- question 4: What is the effect of combination nudges on online customer purchasing in South Africa.

The study measured customer response through three dependent variable questions related to , perceived quality, interest in purchasing the product, and interest in purchasing online. The selected nudges were based on their usage and relevance in South Africa and their high usage on the Superbalist e-commerce platform which was used as dummy website page for the study and will be explained in detail in Section 2.4.

1.4. Main Research Objectives

The proposed study's principal goal is to describe the effect and influence of digital nudging on the e-commerce websites users in South Africa. The following sub-objectives were derived from the main research objective aimed to help the researcher address the research question:

Research objective: To understand the effect of digital nudging on e-commerce purchasing South Africa
Sub Objective 1: To understand the effect of digital nudge 1 (*timed promotion nudge)* on the online customer purchasing in South Africa
Sub-objective 2: To understand the effect of digital nudge 2 (*shipping information nudge)* on the online customer purchasing in South Africa
Sub-objective 3: To understand the effect of digital nudge 3 *(returns information)* on the online customer purchasing in South Africa.
Sub-objective 4 To understand the effect of combination nudges (*all three combination nudge types)* on the online customer purchasing in South Africa

1.5. Research Methods

For the current research, an experimental e-commerce platform was developed based on Superbalist e-commerce store to customize three digital nudges that were tested. The base product page was initially designed, followed by the design and editing of the three nudges and their combinations. To evaluate the effectiveness of digital nudges, screenshots of various product page versions with different nudges were presented in the form of a questionnaire to participants in South Africa.
The questionnaire was developed using Office Forms and included questions related to demographic information, dependent variable measurements (as outlined in Section 1.2), and shoe interest. The selection and design of digital nudges, as well as questionnaire questions, were informed by the academic and non-academic literature discussed in the theoretical background section. This section also introduces the concepts used in the study, reviews previous case studies, and identifies existing research gaps.
As an exploratory study, this research examines the effect of digital nudges on e-commerce users in South Africa. Although several non-academic case studies have been conducted on the same digital nudges examined in this study, few have drawn inspiration from them (Mirsch et al., 2017).
To ensure the rigour of this study, a mixed-methods approach was employed, combining qualitative and quantitative data collection techniques. The questionnaire provided quantitative data, while in-depth

interviews and focus group discussions were used to gain further insights into users' attitudes and experiences with digital nudges on e-commerce websites.

1.6. Assumptions and Limitations

i) This research assumes that most respondents are not experts in the fieldof e-commerce; therefore, they have a limited understanding of nudging and the potential influences involved.

ii) The participants in this study were representative of e-commerce users in South Africa.

iii) The digital nudges used in this study are relevant and applicable in the e-commerce context in South Africa.

iv) A sample size of 222 was sufficient to provide meaningful insights into the effect of digital nudging on e-commerce users in South Africa.

v) This study assumes that consumer trust issues surround e-Commerce in South Africa.

Limitations

i) This study focused on individuals in SA; therefore, individuals living outside the SA were excluded. The targeted population incorporates the general public that make use of e-commerce website services only in South Africa,

ii) The study design is experimental, which may not fully capture the complexity and variability of real-world e-commerce behaviour.

iii) Trust is an important factor in e-commerce, and this study did not explicitly measure or control participants' trust in e-commerce websites or nudges.

1.7. Significance of Study

Studying the effect of digital nudging in e-commerce in South Africa is significant as it can provide insights into consumer behavior and the effectiveness of user experience design strategies in the e-commerce industry. This can help businesses build trust with their customers and contribute to the growth of e-commerce in the country. According to Statista (2022), the e-commerce market in South Africa is expected to reach a value of 7.98 billion U.S. dollars by 2025, thereby demonstrating its rapid growth and potential. However, trust remains a critical issue in the e-commerce industry in South Africa due to concerns about online fraud and data privacy. By exploring the effect of digital nudging on consumer trust in e-commerce, businesses can identify ways to build trust and enhance their online reputations. Furthermore, digital nudging is a subtle and effective technique used by businesses to influence consumer behavior. By understanding how digital nudges affect consumers in the South African e-commerce market, businesses can tailor their e-commerce design and marketing strategies to increase sales and improve customer satisfaction.

1.8. Ethics and Ethical Considerations

All participants in this study were ensured that their responses were/always will be treated with anonymity, although demographical information such as age and gender were collected and used to accomplish stipulated research objectives. This research has gone through the ethical clearance process overseen by the UCT Ethics committee. Further ethics and ethical considerations are detailed in section 3.5

1.9. Structure of Dissertation

This thesis is organized into several chapters. In Chapter 1, the background and motivation for the research are presented, along with the research questions and the chosen research method. Moving forward, Chapter 2 delves into the relevant literature, focusing on the theoretical background, foundation, and hypotheses of the study. Chapter 3 describes the methodology of the study, outlining the design of the main product page, the nudge design, and the questionnaire. This chapter will present a detailed discussion of the research design. In Chapter 4, the results and analysis of the study are presented. The data will be categorized into two sections: single nudges and nudge combinations. Averages, ANOVA, correlations, and Tukey's test will be utilized in the analysis to answer the research questions presented in the introduction and the

hypotheses set in Chapter 2. Finally, in Chapter 5, a summary of the research questions and their corresponding answers are provided. The chapter concludes with a discussion of the practical and theoretical contributions of the study as well as suggestions for future research and any limitations of the study that need to be acknowledged.

2. Literature Review

The pertinent literature is reviewed in this section. This chapter introduces the key terms that will be utilized in the study before going over earlier case studies and highlighting the research gap. Lastly, this chapter will summarize the research questions and proposed research hypotheses.

2.1. Nudging Theory

Nudge theory is a contemporary approach to comprehend human thought processes and decision-making behaviour (BusinessBalls, 2020; Mirsch et al. 2017; Thaler & Sunstein, 2008; Weinmann et al. 2016). To analyze the way in which "nudgees" - those being nudged - process information in decision-making scenarios, the concept of nudging draws upon psychological and neuroscientific theories, particularly the dual process theory (Thaler & Sunstein, 2016). This theory posits that humans employ two distinct modes of thinking, referred to as System 1 and System 2 (Kahneman, 2015). System 1, also referred to as the automatic system, is fast, intuitive, and unconscious, and relies on heuristics and biases to solve problems without conscious effort. By contrast, System 2, known as the reflective system, is deliberate, slow, self-aware, and follows a set of rules (Thaler & Sunstein, 2016). Ideally, individuals would make rational decisions solely through reflective systems. However, in reality, people often resort to their automatic system, conserving cognitive resources and leading to irrational decision making. So what is nudge and why should people care about the formulation of this theory? In their 2008 book Nudge: Improving Decisions about Health, Wealth, and Happiness, economists Richard Thaler and Cass Sunstein brought this term to prominence. They state that due to human beings' cognitive biases (based on psychology research), we can deliberately design how information/choices are presented to individuals, and hence influence their behaviour. That is, people can be nudged to achieve desired results. In our daily life, we might be nudged towards making a decision, whether we know it or not. A famous nudge example is a housefly painted onto the ceramic of a urinal that encourages its users to aim better at Schiphol Airport in Amsterdam (Thaler and Sunstein, 2008, p. 4). In recent years, the UK government led by David Cameron and the US government led by Barack Obama have favoured nudge theory in government policy-making. In 2010, the British Behavioural Insights Team (BIT), also known as the 'Nudge Unit' was established. In 2014, the US White House's Social and Behavioural Science Team (SBST) was established, aiming to apply insights from social and behavioural science to policy for the benefit of the American people. In Australia, the

Commonwealth and various state governments have also started exploring how the government can apply nudge theory to improve regulatory design. For example, the government of New South Wales (NSW) established a Behavioural Insights community of practice in 2012 and have successfully nudged people to pay fines and taxes on time (Easton, 2014). In 2015, the Behavioural Economics Team of the Australian Government (BETA) or 'nudge unit' was founded, aiming to use behavioural economics to improve policy outcomes. In the same year, the Australian Securities and Investments Commission (ASIC) announced one 'nudge' study (ASIC Report 427), which aims to identify the most influential information for investors regarding investment decisions when they are reading the prospectus of hybrid securities (ASIC, 2015). At the same time, nudge theory is increasing in popularity with business leaders, public health authorities, and academia. For instance, Google is applying nudge theory in various forms to increase productivity and happiness of employees (e.g. Bock, 2015; Ebert and Freibichler, 2017). The 'nudge unit' in the UK applies the insights of nudge theory to improve public health prevention (Quigley, 2013).

In light of this, Thaler and Sunstein introduced a libertarian paternalist framework to aid decision-making and offer guiding principles for designers of nudges. Since then, a liberty-respecting understanding of nudging as a soft form of paternalism has been established in both behavioral economics and information systems research. According to the paternalistic principles of nudging, nudgees should always have freedom of choice in decision-making environments, with no options restricted or hidden (Thaler & Sunstein, 2016). Furthermore, nudge architect are not permitted to manipulate the decision-making environment through coercion. Nudge theory is commonly used to explain and alter unhelpful influences on human behavior and decision making (BusinessBalls, 2020). The theory gained recognition through the publication of "Nudge: Improving Decisions about Health, Wealth, and Happiness" by Thaler and Sunstein (2008). This draws heavily from the work of psychologists Tversky and Kahneman (1974), who focused on heuristics and psychological effects in decision-making.

2.2. Heuristics

As previously indicated, Thaler and Sunstein initially drew inspiration for their work from psychologists Daniel Kahneman and Amos Tversky's studies on heuristics (Thaler and Sunstein, 2008). Although Thaler and Sunstein emphasize heuristics as being essentially associated with nudges, nudge theory has evolved over time alongside digitalization. Yet it's crucial to understand what these initial heuristics are because they serve as the foundation for the theory. A key component of the nudge design process detailed in Chapter 2.4 is these heuristics. The following are the heuristics (Minoi et al. 2020, p. 3)

2.2.1. Anchoring Effect

The anchoring effect refers to the tendency of individuals to be influenced by irrelevant numbers (Schwartz, 1974). Research studies have consistently demonstrated that individuals are likely to provide higher or lower responses when presented with higher or lower numbers, respectively. This phenomenon is essential to consider when negotiating or evaluating prices as it can significantly impact our behavior beyond our conscious awareness (Schwartz, 1974). For example, when asked whether Gandhi was more than 114 years old when he died, participants are likely to estimate his age at death much higher than those who were asked whether he was more or less than 35 years old. These findings suggest that individuals' responses can be significantly influenced by the prevailing circumstances.

2.2.2. Availability Effect

The availability heuristic is a cognitive bias in which individuals rely on easily accessible information to make judgments about the likelihood of an event (Tversky & Kahneman, 1973). It operates under the assumption that the ease with which people can recall instances of an event is a reliable indicator of its probability (Schwarz, 2011). This heuristic is based on the idea that if something can be easily brought to mind, then it must be important (Kahneman, 2011). The perceived magnitude of the consequences of an action is positively associated with the availability of its outcomes (Morewedge & Kahneman, 2010). Although this mental shortcut can be advantageous in certain situations, the frequency of events coming to mind is often an inaccurate reflection of real-life probabilities (Kahneman & Tversky, 1973).

2.2.3. Optimistic Bias

Kahneman (2011) notes the existence of a cognitive bias called the "optimistic bias," which is potentially the most important cognitive bias. This cognitive bias results in individuals having the false belief that they possess significant control over their lives. Empirical evidence for this bias is evident in the "planning fallacy," which refers to an individual's tendency to overestimate the benefits and underestimate the costs of a given project, leading to a high propensity to take on risky endeavors. For example, a natural experiment showed that the planning fallacy resulted in initial kitchen remodeling cost estimates averaging $18,658, but actual costs averaging $38,769 (Kahneman, 2011; Buehler et al., 2002).

2.2.4. Overconfidence

Kahneman (2011) introduced the concept of "What You See Is All There Is" (WYSIATI) to explain the phenomenon of overconfidence. This theory asserts that the mind primarily deals with known phenomena, or "Known Knowns," that it has already observed and rarely considers "Known Unknowns," phenomena that it knows are relevant but about which it has no information. Moreover, the mind tends to be oblivious to the possibility of "Unknown Unknowns or phenomena of unknown relevance. Consequently, individuals often fail to account for complexity and their understanding of the world is limited to a small and inherently biased set of observations. Additionally, the mind often fails to account for the role of chance, and falsely assumes that a future event will mirror a past event (Kahneman, 2011).

2.2.5. Framing

Framing in decision making refers to the context in which options are presented to individuals. In an experiment conducted by Levin, Schneider, and Gaeth (1998), participants were presented with the choice of whether to undergo a surgical procedure, with one group receiving a positive framing of a 90 percent survival rate and the other group receiving a negative framing of a 10 percent mortality rate. Despite the fact that the two groups received identical information, the framing of the decision options had a significant impact on participant responses, with greater acceptance observed in the group that received positive framing with a 90 percent survival rate. Other heuristics include temptation, framing, mindlessness, self-control strategies, conforming following the herd, the spotlight effect, priming, language and signage design, and feedback.

2.3. Digital Nudging

The use of user-interface design features to direct people's behaviour in digital choice settings, according to (Weinmann et al. 2016, p. 434). User interfaces such as web-based entities (websites, online businesses, etc.) and displays that need individuals to make decisions are also defined as digital choice environments. Digital nudging is defined by Mirsch et al.(2017) as an technique based on insights from behavioural economics that utilises user interface (UI) design features to influence users decisions in digital settings (Mirsch et al.2017, p. 634-635). In recent years, the increasing use of digital technologies has led to the emergence of digital nudging as a new research area. Research on digital nudging has shown that it can be a powerful tool for encouraging positive behaviors such as increasing physical activity, reducing energy consumption, and promoting healthy eating habits. For example, Higgs et al. (2019) found that digital nudges, such as reminders and social comparison feedback, can increase physical activity levels in sedentary adults. Similarly, Kaczmarek and Muszyńska (2019) showed that digital nudges, such as personalized feedback and goal setting, can lead to a significant reduction in energy consumption in households.

However, the use of digital nudging raises ethical concerns, particularly regarding privacy and manipulation issues. For instance, there is a risk that digital nudges may be used to exploit users' personal data for commercial or political purposes or to push them towards behaviors that are not in their best interests. To address these concerns, researchers have called for the development of ethical guidelines and best practices for digital nudging in different contexts (Hafenbrädl et al. 2020). In conclusion, digital nudging represents a promising area of research for promoting positive behaviors and improving well-being. However, it is important to balance the potential benefits of digital nudging with ethical considerations to ensure its use in a responsible and transparent manner.

In the realm of e-commerce, digital nudging, defined as the utilization of user-interface design elements to steer individuals' behavior in digital decision-making contexts (Weinmann, Schneider, & Brocke, et al., 2016), operates on the same principles as nudge theory. One approach, referred to as opt-out instead of opt-in, involves the choice architecture being designed in such a way as to automatically choose a decision for the individual based on what is predicted to be the most rational choice for that person (Dennis et al., 2019). Research has shown that such priming, in the form of numeric and semantic priming, can have a significant impact on consumers and their willingness to pay, as demonstrated through an auction-type scenario (Dennis et al., 2019). While the effectiveness of digital nudging has

been demonstrated, it has also raised ethical concerns about the potential manipulation of knowledge for undesirable purposes. Despite efforts to establish ethical guidelines for the use of digital nudges by various researchers (Lembcke et al., 2011; Meske & Amojo, 2010; Renaud & Zimmermann, 2009; Fansher et al., 2015), evidence continues to suggest that choice architecture design is being used in unethical ways (Dennis et al., 2019).

While the effectiveness of digital nudging has been demonstrated, ethical concerns have been raised regarding its potential use for manipulative purposes. Despite efforts by various researchers to establish ethical guidelines for the use of digital nudges, evidence suggests that choice architectural design is being used unethically. (Weinmann, Schneider, & Brocke, 2016; Dennis et al., 2019; Lembcke et al., 2011; Meske & Amojo, 2010; Renaud & Zimmermann, 2009; Fansher et al., 2015).

2.4. Digital Nudging on e-Commerce Websites in South Africa

Electronic Commerce (E-Commerce) is currently an application on the Internet that is very popular among users on the Internet today. Activities conducted using an electronic system that can connect sellers and buyers so that transactions take place electronically on this website. (Kowanda etal), 2018 E-commerce platforms and online shops, for example, are sophisticated digital systems with many distinct features, many of which might be classified as nudges. (Mythili and Kiruthiga), 2021.

Digital nudging has become an increasingly popular approach in e-commerce websites to influence consumer behavior and increase sales. In the context of South Africa, e-commerce is a growing industry that has experienced rapid growth in recent years, with a projected market size of over R225 billion by 2025 (Frost & Sullivan, 2021). With the increasing adoption of digital technologies in the country, it is important to understand the potential of digital nudging in shaping consumer behavior in this market. Research on digital nudging in e-commerce has identified several effective techniques for influencing consumer behavior, such as scarcity messages, social proof, and personalized recommendations (Algesheimer et al., 2005; Tseng et al., 2016). For example, a study by Lee et al. (2019) found that personalized recommendations significantly increased consumers' purchase intention in online shopping. Similarly, a study by Riedl et al. (2016) showed that scarcity messages can increase consumers' perceived value of products and lead to higher purchase intention. In the South African context, however, there is a need to consider cultural and socio-economic factors that may influence the effectiveness of digital

nudging. For instance, research has shown that consumers in South Africa value trust and social connections in their purchasing decisions (Hudson et al., 2015), which may affect the impact of social proof and recommendation techniques. Additionally, concerns around data privacy and security may affect consumers' willingness to engage with personalized recommendations and other forms of digital nudging. In conclusion, digital nudging has the potential to be an effective approach for increasing sales and shaping consumer behavior in e-commerce websites in South Africa. However, it is important to consider the cultural and socio-economic context of the country, as well as ethical considerations around data privacy and security, when designing and implementing digital nudges in this market.

2.4.1 Previous Digital Nudge Studies in E-commerce

Digital nudging studies conducted in the context of e-commerce are relatively scarce. Dennis et al. (2020) conducted a study on numeric and semantic priming in the e-commerce domain. The authors acknowledge that previous research on e-commerce has largely emphasized conscious and rational cognitive processes. Nevertheless, they suggest that priming can also impact purchasing decisions, a conclusion supported by prior research in psychology and marketing (Dennis et al., 2020)

Luo et al. (2019) conducted a study that investigated the impact of e-commerce cart targeting on consumer behavior. Specifically, the researchers examined the effects of scarcity and price incentive nudges on purchase rate when these nudges were presented in the shopping cart. The findings of the study suggest that ECT has a significant impact on consumer purchases, with digital nudging resulting in a 29.9% higher purchase rate when compared to targeting users without shopping carts. Furthermore, the study revealed that the incremental effect of the nudges is moderated. The authors note that displaying a price incentive in the shopping cart amplifies the effect, but providing the same price incentive without a shopping cart results in ineffective e-commerce targeting (Luo et al., 2019).

Furthermore, Luo et al. (2019) discovered that providing a scarcity message reduces the impact on consumer purchases. An intriguing aspect of the study is that the scarcity message, which is relatively inexpensive to create, was 2.3 times more impactful than offering consumers a price incentive, particularly in the early phases of shopping. However, in the later stages of the purchase funnel, the price incentive was 11.4 times more effective than delivering a scarcity notification, demonstrating that the effect of a digital nudge is contingent upon the shopping stage where it is presented (Luo et al., 2019).

Toreini and Maedche (2018) adopt a distinct perspective in their research paper by highlighting that digital nudging may not be as effective as it is presumed to be. To address this issue, the authors suggest the need for more invasive techniques to examine digital nudging. They propose that alternative interfaces, such as eye-tracking technology, can provide a better understanding of the potential impact of digital nudges. They recommend the provision of real-time feedback to users who fail to recognize a digital nudge. Although the study has yet to be conducted, their paper proposes an interesting approach to analyzing the influence of digital nudging in the e-commerce setting, where numerous nudges coexist, and it is necessary to determine whether the test subject or user has noticed a specific nudge (Toreini & Maedche, 2018).

Kizilcec, Bailenson, and Gomez (2015) conducted a digital nudging experiment in an online shopping context. They used virtual reality technology to create an immersive shopping environment and tested the impact of virtual salespeople on customers' purchase behavior. The study found that the virtual salesperson increased customers' purchase intention and influenced their product choices. Liu, Li, and Huang (2018) conducted an experiment to examine the effectiveness of personalized product recommendations in an e-commerce context. They found that personalized recommendations significantly increased customers' purchase intention and willingness to pay, compared to non-personalized recommendations.

Huang, Zhang, and Liang (2020) conducted an experiment to test the effect of social proof on customers' purchase behavior in an e-commerce setting. They found that displaying a number of product views and purchases increased customers' perceived popularity of the product, which in turn increased their purchase intention. Lin, Huang, and Liang (2019) conducted an experiment to investigate the impact of different types of product descriptions on customers' purchase behavior in an online store. They found that product descriptions that emphasize the product's benefits (e.g., how the product can improve the customer's life) are more effective in increasing purchase intention than descriptions that emphasize the product's features (e.g., what the product does).

Chen, Guo, and Sun (2021) conducted an experiment to test the effect of time pressure on customers' purchase behavior in an e-commerce context. They find that time-limited discounts and countdown timers significantly increase customers' purchase intentions and actual purchases.

Schmitz et al. (2020) conducted a field experiment to examine the impact of digital nudges on customers' purchasing behavior in an online grocery store. They tested different nudges, including social proof, scarcity, and authority, and found that nudges led to an increase in the number of items purchased and the total amount spent by customers. Lin and Hsieh (2020) conducted an online experiment to investigate the impact of different types of digital nudges on customers' purchase decisions in a fashion e-commerce website. They found that social proof nudges, such as showing the number of previous customers who purchased the same item, were more effective than scarcity and authority nudges in increasing the likelihood of purchase.

Choi and Lee (2019) conducted an online experiment to examine the effect of digital nudges on customers' donation behavior on a charity e-Commerce website. They tested different nudges, including social proof and framing, and found that the nudges led to an increase in the donation amount and number of donors. Upon closer examination of the studies mentioned above, it is evident that various digital features can be perceived as digital nudges. Although each study defines what constitutes a nudge differently, they all share a common understanding of the underlying principles of the theory, which helps explain user behavior in digital settings. Furthermore, all studies explore digital nudging in the e-commerce domain, and while some of them report positive effects, they acknowledge that improper nudging can have detrimental consequences (Luo et al., 2019).

In conclusion, prior research has established that digital nudges are effective in shaping user behaviour. Numerous studies, as referenced above, have investigated the use of social proof nudges on e-commerce platforms, consistently demonstrating their ability to positively influence customer decisions by prompting subsequent purchases. While it would have been valuable to examine the impact of social proof within the South African e-commerce landscape, this study deliberately excluded such nudges despite their proven efficacy. Instead, the research focused on exploring less conventional forms of digital nudging, such as the presentation of shipping information. Although not traditionally categorized as a nudge, Mirsch et al. (2017) argue that such elements fit within the broader definition of digital nudging, which involves leveraging user interface components to steer behaviour in digital decision-making environments. This study also investigates additional elements like timed promotions and return policy information to assess their influence on consumer behaviour.

2.5. Digital Nudging in Other Digital Environments

The primary aim of this chapter is to emphasize the absence of research in the field of digital nudging and e-commerce in South Africa. The studies discussed in this chapter most closely align with the methodology proposed in this thesis. All of the papers provide a detailed account of their nudge design and assess their outcomes using the nudge theory as a framework. However, despite sharing a fundamental approach, they did not incorporate the contextual element of e-commerce in South Africa, which is the focal point of this thesis.

Bammert et al. (2020) examined the potential of digital nudging for business processes and concluded that it provides a valuable foundation for business process improvement (BPI). They compared digital nudging to A/B testing in terms of its ability to quickly validate improvement ideas and reduce the latency to improve these processes. Although their study provided a broad account of the potential of digital nudging, their observation that digital nudging is similar to A/B testing is noteworthy, as this thesis will structure data collection in a similar way to web-based A/B testing.

Schneider et al. (2020) conducted a case study that examined the use of nudge theory to increase the adoption of electronic identification (eID) through changing the decision-making environment. They used two nudges: default options (eID vs. offline ID) and popularity signals (presence vs. absence of social proof). Their findings indicated that both nudges increased eID adoption; however, they noted that the default option design was a double-edged sword.

Another study by Wijland et al. (2016) investigated the effectiveness of digital nudging in a mobile environment, specifically with banking apps and youth engagement. They found that digital nudging can provide valuable insights and ideas for new features or improvements, prioritizing intuitive interfaces over nonintuitive designs. Their study revealed that banking app design could benefit from digital nudging, which they noted is a fundamentally different approach that emphasizes behavioral economics and nudging (Wijland et al. 2016).

Although the aforementioned studies share similarities with this study in terms of nudge design and theoretical underpinnings, they operate in a distinct context. No study has specifically examined the effect of the chosen digital nudges commonly found on e-commerce product pages in South Africa. Nevertheless, certain conclusions can be drawn from these studies. The principal finding is that the impact of digital nudges is statistically significant, whether it is positive or negative. Furthermore, these studies underscore the significance of the nudge design process and recommend testing multiple iterations of a given nudge to ascertain its effectiveness.

Multiple studies such as Tan et al. (2018) and Huang et al. (2018) have explored individual digital elements, such as reviews and social sharing. However, there is a limited amount of research that has looked at the combined effects of multiple nudges in the context of e-commerce in South Africa. A body of literature, including studies such as Luo et al. (2019), has demonstrated the relevance of nudge theory in the context of e-commerce and the various digital features frequently displayed in online shops. Weinmann et al. (2016) defined digital nudging as utilizing user-interface components to steer users' behavior in a digital choice setting, a definition that this research aims to follow. Similarly, Mirsch et al. (2017) proposed that digital nudging warrants further investigation and listed a number of exemplary nudges and associated psychological effects that have been researched thus far. The nudge designs provided in the paper, including checkboxes and information-providing elements, align with the elements under investigation in this thesis, rendering the nudge theory and its literature review a suitable foundation for analyzing product page elements in the e-commerce domain. Consequently, these findings are valuable in interpreting the outcomes of this study.

2.6. Ethics of Digital Nudging

Digital nudging has become a popular tool in e-commerce research, with numerous experiments examining the effectiveness of various nudging techniques in influencing consumer behavior. However, as the use of digital nudging in e-commerce has increased, concerns over its ethical implications have emerged. One ethical concern is the potential for digital nudging to be manipulative or deceptive, especially when users are unaware of the nudges or do not have the ability to opt-out (Boerman et al., 2017). This can be particularly problematic in cases where nudges are designed to exploit users' cognitive biases or vulnerabilities or where the nudges are intended to benefit the seller rather than the consumer.

Another ethical issue concerns the use of personal data to tailor nudges for individual users. While personalization can improve the effectiveness of nudges, it also raises concerns about user privacy and the potential for companies to use personal data for various purposes (Liao & Cheung, 2019). Additionally, personalized nudges may have unintended consequences or even harm users if the data used to personalize the nudges are inaccurate or incomplete. Another ethical issue is the lack of transparency around digital nudging, as users may not be aware of the nudges or how they are used to influence their behavior (Kozinets et al., 2019). This lack of transparency can erode users' trust in e-commerce platforms, and may ultimately harm businesses in the long run.

To address these ethical concerns, researchers and practitioners in e-commerce should strive to be transparent about their use of digital nudging, provide users with the ability to opt out of nudges, and ensure that nudges are designed to benefit users rather than exploit them (Boerman et al., 2017). Furthermore, researchers should strive to strike a balance between personalization and privacy by ensuring that users have control over their personal data and that they are used ethically and responsibly (Liao & Cheung, 2019).

In conclusion, the ethical implications of digital nudging in e-commerce are complex and multifaceted, and require careful consideration by researchers, practitioners, and policymakers. While digital nudging has the potential to benefit both consumers and businesses, it is important to ensure that it is used ethically and transparently and that users are not exploited or manipulated in the process.

2.7. Choice of Nudges

The selection of nudges for this study was primarily driven by academic, considerations. According to OnedayOnly reports, discounts and deals are why 80% of consumers shop online in South Africa, hence the research chose timed promotions as a nudge. In another study by Statista, just over 70 percent of the respondents mentioned "direct delivery to my home" as a main driver of online shopping in 2022, and a strong, customer-centric e-commerce returns policy translates directly into a promise of satisfaction for them and more sales for the business. (Comalitcs.com.2023) hence the choice of shipping information and returns information as nudges to study. Specifically, nudges were chosen based on their popularity on various e-commerce platforms in South Africa. Superbalists are leading e-commerce websites in South Africa providing a wide range of fashion and lifestyle products. As an e-commerce website, Superbalist offers a unique opportunity to conduct research experiments because of its well-established platform and reputation for quality products and services. E-commerce websites have been operational for over a decade and have a solid reputation for trustworthiness and reliability, as evidenced by its numerous positive reviews and ratings from customers (Superbalist, 2022).
Furthermore, superbalists have implemented several measures to address the issue of trust in the South African e-commerce market, such as secure online payment systems, transparent delivery policies, and clear return and exchange policies (Superbalist 2022). These measures provide a foundation for conducting research on the effectiveness of nudges in improving customer trust and increasing sales. In addition, e-commerce websites offer a diverse selection of fashion and lifestyle products, with fashion and shoes being the most consumed products online in South Africa (Naidoo, 2021). This makes Superbalist an ideal platform for studying the effectiveness of nudges on consumer behavior in a context that is relevant to the South African market.

2.8. Theoretical Underpinnings

Nudging has become a popular approach for behavioral change interventions in various domains, including healthcare, education, and environmental sustainability. A key aspect of effective nudging is the design of the nudge itself. There are various models and tools available to guide the design of nudges.

Johnson et al. (2012) presents a framework for designing nudges based on the available tools for choice architects. The framework includes tools for structuring the choice task and describing the choice options. The authors argue that choice architects should consider the potential impact of different tools on decision-making and use them strategically to achieve the desired outcome.

Weinmann et al. (2016) present a model for designing digital nudges specifically, which consists of three steps. The first step focuses on the nature of the choice and considers whether it is binary, continuous, or discrete. The second step considers the biases or heuristics that may affect the user's decision-making and includes elements such as the decoy effect, middle-option bias, and status quo bias. The third step involves designing the user interface to take advantage of the biases identified in step two.

This study adopts a more hands-on approach compared to previous investigations by creating a custom-made system to facilitate various types of nudges on Superbalist eco e-commerce stores. To achieve this, the study relied on the digital nudge design model proposed by Weinmann et al. (2016), whenever applicable. As the Superbalist served as the platform for the study, certain elements of the nudges were unchangeable; therefore, the model was only employed for modifiable nudge aspects. The model suggests three fundamental stages for designing a digital nudge:

1 Determine the type of choice to be influenced.
2 Determine the heuristic or bias that might influence the user.
3. Design the element and user-interface pattern that supports the hypothesis of the heuristic or bias

Meske et al. (2017) propose a process model for the design of nudges that combines elements of persuasion and nudging. The model includes three stages: (1) identification of nudging elements, (2) selection of the most relevant nudging conditions, and (3) development of the nudging process. The authors argue that their process model can guide the design of nudges both systematically and effectively. Meske et al. (2017) conducted a literature review of relevant psychological effects and provided examples of nudges. They identified a total of 20 psychological effects that have been studied in digital nudging, including framing, status quo bias, social norms, loss aversion, anchoring and adjustment, hyperbolic discounting, decoupling, priming, and the availability heuristic (Meske et al., 2017, pp. 2592-2593). Although all these effects are of interest, only three were selected for this study, with each chosen nudge targeting a different psychological effect. The selected nudges have been discussed in the previous section.

Table 1 Nudge and psychological effect

Nudge	Psychological effect
Timed Promotions	Scarcity Effect
Shipping Information	Loss Aversion
Returns Information	Availability Heuristic

2.9.1 Timed Promotions

Timed promotions are popular marketing tools used by e-commerce retailers to encourage consumers to make purchases within a limited timeframe. In the South African e-commerce context, where clothing is a popular category for online shopping, and trust is a major concern for consumers, timed promotions may trigger several heuristics that can impact consumer behavior.

One important heuristic that may be triggered by timed promotions is the scarcity heuristic, which refers to the tendency for people to place a higher value on items that are perceived to be rare or in short supply (Worchel et al., 1975). Research has shown that scarcity can be a powerful motivator for consumer behavior, leading to increased purchase intentions and willingness to pay higher prices (Amaldoss & Jain, 2005).
However, research suggests that the impact of timed promotions on consumer behavior may depend on several factors, such as the perceived value of the product, timing and frequency of promotions, and trustworthiness of the e-commerce retailer (Li et al., 2020). In the South African e-commerce context, where trust is a major concern for consumers, retailers may need to take additional steps to build credibility and alleviate concerns regarding security and fraud (Muntingh et al., 2017).

One potential approach is to emphasize the quality and authenticity of clothing products, as research has shown that perceptions of quality and value can be key factors in building trust and reducing uncertainty in online shopping (Wolny & Charoensuksai, 2017). Additionally, retailers may need to consider the timing and frequency of timed promotions because too many promotions or discounts may signal lower product value or quality, leading to decreased trust and willingness to pay (Harris et al., 2015).

In recent years, several studies have examined the impact of timed promotions on consumer behavior and the underlying heuristics that may be triggered. For example, Ali and Lee (2019) found that time-limited promotions can increase purchase intentions and sales, particularly when coupled with scarcity messaging. Similarly, Okazaki and Rivas (2020) found that timed promotions can be effective in increasing website traffic and sales, particularly when targeted at specific customer segments.

2.9.2. Shipping Information

The provision of shipping information on e-commerce websites triggers several heuristics, including loss aversion, especially in a South African e-commerce context, where clothing is the most purchased category and trust is a major concern. Loss aversion refers to the tendency of people to experience losses more acutely than gains, which can influence their decision-making. In the context of e-commerce, shipping information can trigger loss aversion by making consumers aware of potential losses such as additional costs, delayed delivery, or lost packages. Consumers may also perceive the absence of shipping information as a potential loss of control over the shipping process, leading to increased anxiety and decreased purchase intentions (Kim & Park, 2012).

In the South African e-commerce context, shipping information can be particularly important in building consumer trust and reducing perceived losses. Clothing is the most purchased category in South African e-commerce (eMarketer, 2021) and consumers may have high expectations for shipping and delivery because of the nature of the product. Moreover, with smartphones, consumers can purchase their items wherever they are and get them delivered to their chosen address. This is also one of the main drivers of online purchase in South Africa. Just over 70 percent of the respondents mentioned “direct delivery to my home’ as the main driver of online shopping in 2022 (Statistica, 2023); therefore, online retailers must provide accurate and transparent shipping information to reduce perceived losses and increase trust.

Research suggests that shipping information can also trigger loss aversion through shipping fees and thresholds. Shipping fees can be perceived as a loss or an additional cost to the consumer, which can lead to a decreased purchase intention (Wang & Lee, 2019). By contrast, offering free shipping above a certain threshold can trigger loss aversion by creating a perceived loss when consumers fall short of the threshold (Kim & Park, 2012).

2.9.3. Returns Information

Return information is an important factor in e-commerce that can impact consumer behavior, particularly in the context of clothing purchases, where fit and quality are important considerations. In the South African e-commerce context, where trust is a major concern for consumers, return information may trigger several heuristics that can impact consumer behavior. One important heuristic that may be triggered by return information is the availability heuristic, which refers to the tendency for people to overestimate the likelihood of events that are easily recalled from memory (Tversky & Kahneman, 1973). Research has shown that return information can make returns more salient and accessible in consumer memory, leading to increased expectations of returns and decreased purchase intentions (Feldman & Folkes, 2004).

In addition to the availability heuristic, return information may also trigger the heuristic of social influence, which refers to the tendency for people to be influenced by the opinions and behaviors of others (Cialdini & Goldstein, 2004). In e-commerce, social influence can be particularly important for building trust and credibility with consumers, as positive reviews or recommendations from others can signal the quality and value of products or retailers (Cheung et al., 2003).

However, research suggests that the impact of return information on consumer behavior may depend on several factors, such as the clarity and simplicity of return policies, the perceived quality and fit of clothing products, and the trustworthiness of the e-commerce retailer (Shankar et al., 2016). In the South African e-commerce context, where trust is a major concern for consumers, retailers may need to take additional steps to build credibility and alleviate concerns regarding security and fraud (Muntingh et al., 2017).
One potential approach is to provide clear and easy-to-understand return policies that emphasize the quality and fit of clothing products as well as the retailer's commitment to customer satisfaction. Additionally, retailers may need to consider the role of social influence in building trust and credibility, such as by encouraging positive reviews and feedback from satisfied customers (Cheung et al., 2003).

In recent years, several studies have examined the impact of return information on consumer behavior and the underlying heuristics that may be triggered. For example, Liao et al. (2020) found that returns policies that emphasized customer satisfaction and quality led to increased purchase intentions and decreased returns. Similarly, Zhang et al. (2020) found that clarity and simplicity of return policies can impact consumer trust and loyalty.

2.9. Measuring Customer Response

A variety of measurement techniques have been employed in the literature to assess consumer responses to e-commerce websites. These include self-report questionnaires, behavioral measures, eye-tracking, physiological measures, and web analytics. To measure the possible effect of digital nudges, we employed self-report questionnaires that typically use Likert scales to measure consumers' perceptions of various constructs such as attitudes, trust, satisfaction, and purchase intention. Some previous studies have measured slightly different variables which include, information interest as the first stage of online purchasing journey, however this thesis chose three different variables to measure customer response, these variables were chosen to describe the multiple stages of the purchase decision-making process. These variables included perceived quality, interest in purchasing the presented product, and purchase interest in the online setting for the product.

2.9.1. Perceived Quality

Value is a consumer's overall assessment of the utility of a product or service based on perceptions of what is received versus what is given. It is considered a higher-level abstraction than specific benefits and costs [4,16] and is a precursor to loyalty and commitment (Augustine & Singh, 2005). It has been shown that the perceived value is influenced by the perceived quality, which is a predictor of online repurchase intentions (Sullivan & Kim 2018)

2.9.2. Interest in purchasing the presented product.

The first factor is product knowledge, which refers to consumers' understanding of a product. Generally, consumers hardly need information to search for products they are familiar with or often buy. They make decisions mainly based on experience, and they have a strong search intention when they buy new products, H.M Zheng (2006) For the product page that will be presented in this study, a product was chosen in the category of shoes as people differ in what they are willing to order online.

2.9.3. Interest to purchase on the online setting.

As mentioned, sneakers were chosen as the product for product page image, and people were more likely to purchase specific products online than others. Essential items saw the highest surge online, with the majority (81%) of South African consumers saying they purchased data, and over half saying they bought clothing and shoes (56%) and groceries (54%) online since the pandemic started. Another study by Rundansky-Kloppers (2016) revealed that the three most important factors for online purchasing in South Africa are convenience, delivery, and saving time. Convenience is the main reason people purchase online. This trend is not only visible in SA but also globally (KPMG, 2017)

Information interest and interest in purchasing online are measured through a 7 point Likert scale ranging from strongly disagree (1) to strongly agree (7), while interest in purchasing specifically the presented product and perceived quality are measured through a Likert scale of 1 to 4, not at all interested–very interested.

2.9.4. Hypothesis Development

Nudging in e-commerce is still in its early stages. Therefore, to overcome the scarcity of research that experimentally tests the effectiveness of nudges in e-commerce settings, a comprehensive theoretical model must be derived. Since the stimulus in question is psychological in nature, the Stimulus-Organism-Response Model (S-O-R), from environmental psychology (Russell & Mehrabian, 1974), is the model on which hypothesis development is based. Based on this model, environmental stimuli influence the psychological processes of organisms that affect their responses (Russell & Mehrabian, 1974). Stimulus is defined as the element that captures an individual's attention and thereby has the ability to influence the individual (Rossiter & Donovan, 1982). The organism is defined as the cognitive response to a stimulus, and the response is defined as the behaviour that results from the response to the stimulus (Rossiter & Donovan, 1982). One study utilized the S-O-R framework to test the effects of atmospheric cues on the cognitive states of shoppers (Eroglu, Machleit, & Davis, 2003). Applying this model, the nudges are operationalized as the "stimuli," the user's cognitive reaction as the "Organism," and the willingness to buy or reject the target choice as the "Response" (Eroglu et al., 2003). The S-O-R model has not only been applied to evaluate digital nudging (Hummel et al., 2017), but has also been widely applied in the e-commerce domain (Amirpur & Benlian, 2015; Eroglu et al., 2003; Peng & Kim, 2014; Sheng & Joginapelly, 2012); therefore, it is suitable for this study.

This thesis focuses on two psychological effects: the scarcity effect, loss aversion, and the availability effect. These effects are operationalized as stimuli and are used to determine their effectiveness in shifting user preferences towards a positive option in a choice set. This thesis will use statistical hypothesis testing to access the statistical significance of the results.

The hypotheses mentioned in this study were tested to confirm or reject claims. The table below represents the hypotheses for this research, which will be tested and expressed through statistical analysis of the data captured through the research instrument. The hypotheses form the basis of the research model displayed above, and will be tested to meet the aim of this study: to understand the effect of digital nudging on e-commerce website users in South Africa. Below is a list of each hypothesis as well as its related null hypothesis, used to reject or support the hypotheses.

Table 2: hypotheses table

#	Hypotheses
H_1	The absence of a digital nudge on an e-commerce website, i.e., returns information, shipping information, etc., could lead to a less positive customer response than the presence of no nudge.
H_2	The presence of a digital nudge on an e-commerce website, (i.e., timed promotions/Urgency nudge) leads to a more positive customer response than the absence of a nudge.
H3	The presence of a digital nudge on an e-commerce website, (i.e., Shipping information) leads to a more positive customer response than the absence of a nudge.
H4	The presence of a digital nudge on an e-commerce website, (returns information) leads to a more positive customer response than the absence of a nudge.
H5	The combination of nudges on an e-commerce website, (i.e. timed promotions + shipping information + returns information) led to more positive customer responses than the individual nudges.
H6	The combination of nudges on an e-commerce website, (i.e. returns information + shipping information) led to more positive customer responses than the individual nudges.
H7	The combination of nudges on an e-commerce website, (i.e. returns information + shipping information) led to more positive customer responses than the individual nudges.
H8	Customer responses to different nudge variants are different on a statistically significant level

2.10. Conceptual Model

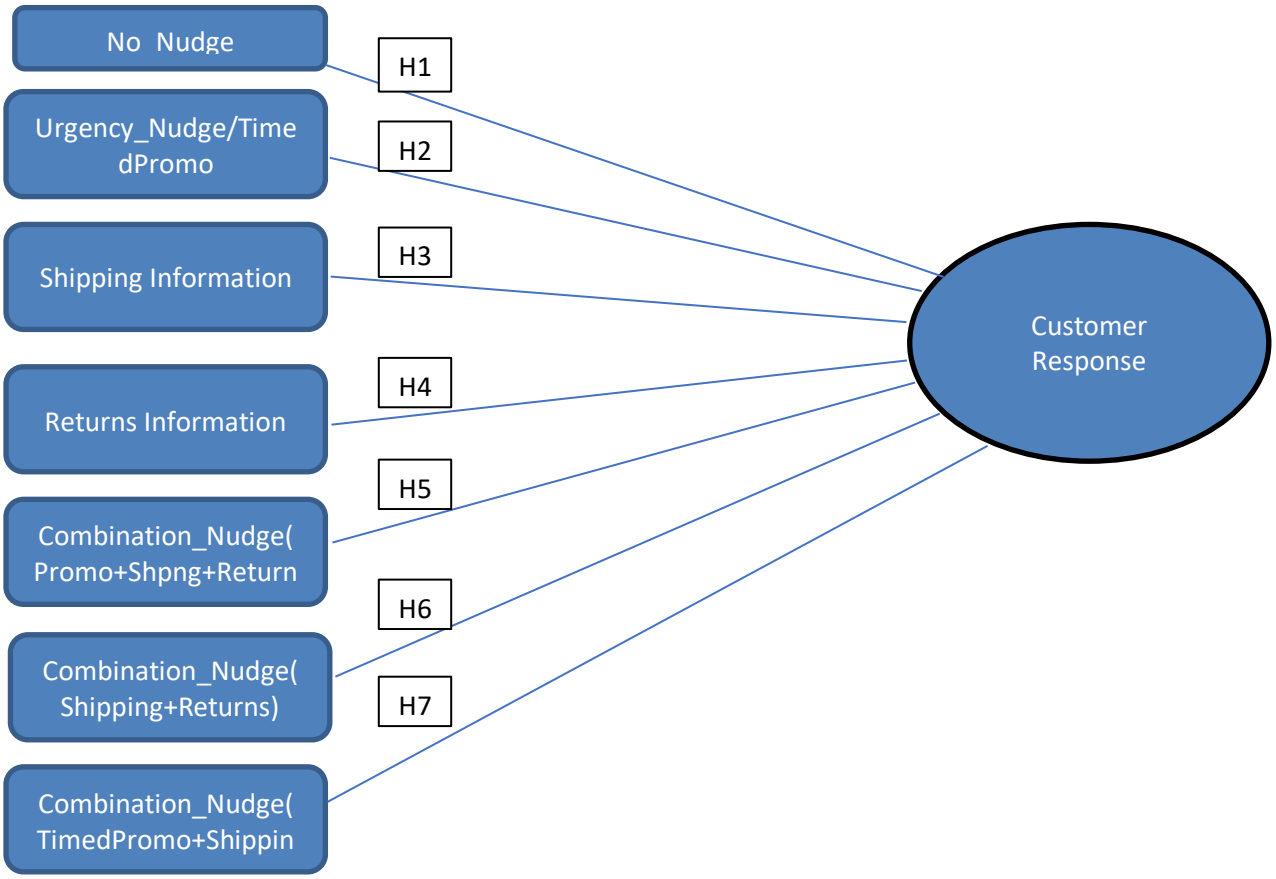

Figure 1 Conceptual Model

H1 + H4 – Based on studies by Dennis et al. (2020) and Luo et al. (2019), clear positive differences between nudge variants compared to no nudging were found, which expects any nudge or any nudge combination to result in a more positive customer response than no nudging at all (H1 + H4).

H5 – H7: Based on the same study (Dennis et al. 2020; Luo et al. 2019). As in the first four hypotheses, this thesis also expects more nudging than less nudging (i.e., combination nudges) to result in a higher customer response.

H8 – The study conducted by Hummel and Maedche (2019) reveals that only 62% of nudging treatments are statistically significant. Nudges had a median effect size of 21%, depending on the type of nudge and context. As expected, defaults are the most effective nudges, while pre-commitment strategies (i.e., you commit now to do something in the future) are the least effective. Moreover, digital nudging is as effective as offline nudging, but it offers new possibilities for individualizing nudges. This study will set out a hypothesizes that the results are statistically significant. The reason for this is that, through practical nudge design, this chapter aims to create an environment where respondents more easily notice nudge variants. This is accomplished by standardizing the design of the base product page.

According to behavioral science, nudge theory, Weinmann et al. (2016) defined digital nudging as utilizing user-interface components to steer users' behaviour in a digital choice setting, a definition that this research aims to follow. For instance, shipping information was considered a nudge in the e-commerce choice environment as it can cause consumers to perceive the absence of shipping information as a potential loss of control over the shipping process, leading to increased anxiety and decreased purchase intentions (Kim & Park, 2012). In conclusion this thesis expects more nudging than less nudging to result in a higher customer response, the following research design and methodology section explains this in further detail.

3. Research Design and Methodology

3.1 Introduction

"Research design is a comprehensive plan for data collection in an empirical research project" (Bhattacherjee, 2012, p.35). According to research practices, research design aims to provide a holistic overview of the research process, including plans, guidelines, procedures, and roadmaps to be undertaken by the researcher(s) (Myers, 2009). This section follows the research process outlined by Saunders et al. (2009) and comprises the following sections: Section 3.2. discusses the research philosophy adopted, and Section 3.3. is oriented around the research methodology, which includes the research strategy, purpose of the research, research approach, target population, and sampling frame, as well as the research instrument and analysis techniques; Section 3.4. discusses the limitations of This study has; section 3.5. discusses the ethics and confidentiality issues associated with this study, and Section 3.6. illustrates the timeframe of the research.

3.2 Research Philosophy

Research philosophies play a significant role in the research process, influencing the research strategy and the methods a researcher chooses as part of that strategy because theadopted research philosophy contains various assumptions on the way in which researchers view the world (Saunders et al., 2009). There are two assumptions regarding philosophical standpoints: ontological stance and epistemological stance (Ajumobi, 2014), which are discussed in Section 3.2.1. and section 3.2.2.

3.2.1. Ontology

Ontology comprises beliefs about the true nature of an environment. Research has found that there is two main ontological perspectives: objectivism and subjectivism (Saunders et al., 2016). These two ontological perspectives provide clear views of the environment. According to the interpretive approach, it is important for researchers as social participants to understand the differences that exit between people (Saunders et al., 2012).

The objective perspective states that the true nature of an environment exists independent of the impact of

humans or other interactions. On the other hand, the subjective perspective states that the true nature of an environment is created or influenced by the impact of humans or other interactions (Orlikowski & Baroudi, 1991; Saunders et al., 2016).

This study's research objectives infer that social interactors influence the nature of the intended environment. Thus, this study adopts a subjectivist ontological perspective. In this study, adopting the subjectivist ontology will allow the researcher to understand complex social phenomena which can be difficult to observe objectively in a digital nudging choice environment. In the context of this study, digital nudging and its objective of influencing user behavior, a subjectivist ontology is ideal as it recognizes that reality is not fixed but rather a dynamic and evolving construct shaped by human experience and interpretation. This perspective will allow the researcher to delve deeper into the human experience, understand the complexity of social phenomena, and develop more meaningful and relevant research

3.2.2. Epistemology

Epistemology refers to beliefs concerning the kind of knowledge a field of study deems legitimate and acceptable, and in which ways such knowledge can be transferred (Burrell and Morgan, 1979; Saunders et al., 2016). Appropriate knowledge may comprise of numerical data, visually displayed data, and text, which may include facts, narratives, and interpretations (Saunders et al., 2016). The literature introduces five primary research epistemological beliefs: These beliefs are positivism, interpretivism, realism, pragmatism, and postmodernism (Wahid, Ahmad, Nor, & Rashid, 2017).

Given the subjectivist belief that human interactions influence the nature of an environment, interpretivist research assumes that social interactors (including researchers) create, constrain, and influence the environment's reality (Bhattacherjee, 2012; Orlikowski & Baroudi, 1991). As such, the true nature of an environment cannot be examined accurately when no social interactions are observed (Burrell and Morgan, 1979).

The proposed study adopts an interpretivist epistemological belief system. The rationale for the selected epistemology is that it stresses the importance of understanding social actors and the impact of their social interactions on the environment (Cussen and Cooney 2017). The need to understand the complexities of human experience and the role of meaning-making in a digital choice environment motivates the choice of an interpretivist epistemology. This belief prioritizes the subjective meanings that individuals attribute to their experiences and actions, therefore making it ideal for this study looking at the effect of digital nudging on the users of e-commerce websites.

3.3. Research Methodology

The research methodology encompasses various activities that a researcher employs to derive reliable outcomes and describes the tasks conducted throughout the research process(Babbie, 2015; Mingers, 2001). The research methodology should provide an accurate explanation of the methods adopted for collecting, measuring, and analyzing data incorporated within the research process (Creswell & Clark, 2007). The following section comprises the adopted research approach, research strategy, and techniquesused when conducting data collection.

This section presents the methodology used in the empirical study. First, the structure of the questionnaire through which the study was conducted was presented. Second, the questionnaire was broken into sections, which were then explained. Third, it explains the process through which the base product landing page is created and designed. Finally, the design of the nudges used in the study will be discussed.

3.4. Structure of the Questionnaire

The questions were divided into three categories: demographic information (questions 1 – 4), dependent variable (questions 5-8), and additional information (questions 9 – 11). The questionnaire is available in Appendix A.

The demographic data, included specifically the respondents age, sex, education, income. These where relevant constructs as they shed light on the attributes of the sample population. According to a study by (World wide Worx, 2024) in 2022, online shopping was most prevalent among the 25-34 age group at 46,3%, followed by the 15-24 age group at 43,7%. The percentage was much lower for those aged 65 and above, at 16,4%. In 2023, the trend remained similar, with the 25-34 age group again having the highest percentage of online shoppers at 46,3%.

According to (Peach payments, 2024) the gender breakdown in particular shows that the traditional gender divide in online shopping, which was dominated by males in the early years still persists, with 41% of men and 36% of women shopping online. According to the report, a contributing factor to men dominating the online shopping space is due to them purchasing electronic goods more frequently, which traditionally is a male shopping domain. However, the fact that the biggest growth areas in online shopping in recent years have been in groceries and apparel categories, traditionally dominated by women shoppers, suggests there are other factors at work. This may include elements like male control of household budgets and men being more like to be the bread winner.

The income construct was important in this study as the research is focused on digital nudging on the users of e-commerce websites, therefore, income gives insight on the affordability of the respondents. In some study's they found a correlation between income and online consumption. According to (Mastercard,2022), on the income scale, the inclination towards online shopping rose steadily, from 22% for those earning less than R2,500 a month to 62% for those earning more than R50,000.

Another relevant demographic construct was education. In a study by (World Wide Worx, 2024), education levels correlated positively with online shopping rates: as the level of education increased, so did the likelihood of shopping online.

In this research, the above constructs shed light on the overall e-commerce consumer in South Africa, however, the study focuses on the effects of digital nudging on the users of e-commerce websites in South Africa and the study's research focuses on the various digital nudges and relationship with the dependent variable questions. See (*Table 3 and 4)* for an example of the dependent variable questions. And nudge types.

3.5. Dependent variables

Three relevant dependent variable questions were developed based on the theoretical research outlined in section 2. The questions/variables below were asked on all seven nudge variations, sections. (No nudge, time promotion/urgency nudge, shipping information nudge, returns information nudge, combination nudge (timed promotions+ shipping + returns information nudge), combination nudge, (shipping information + returns information nudge) and combination nudge, timed promotion + shipping information nudge). Refer to *table 4.*

Table 3: Dependent variable instrument questions

Question	Variable
I believe this product is of high quality	Perceived Quality
I would consider buying a Converse pair of sneakers as my new pair of sneakers	Interest to purchase specifically sneakers
Are you interested in buying these sneakers if you saw them in an online store	Interest to purchase in an online setting

The intent behind these dependent variables was not to establish a causal relationship demonstrating that the implementation of nudge X leads to a quantifiable augmentation in the inclination to purchase product Y. Instead, the primary objective was to scrutinize the collective responses to all questions across different nudge variations. While discerning noteworthy distinctions among the dependent variables within a specific nudge context is significant, it should be emphasized that such disparities do not constitute the central focus of the research inquiry.

3.7. Additional Information

Since this study aims to imitate real-world online shops in South Africa, there needs to be a product. This product ended up being a shoe product, considering that clothing and shoes are among the most purchased products online in South Africa, according to (statista,2022,) In South Africa, the e-commerce landscape in 2022 was predominantly characterized by the Fashion segment, which constituted 32% of the total market value. Subsequently, Toys, Hobbies, and DIY products accounted for 27%, with the Electronics and Media sector trailing behind at 18% Thus, the additional information questions were designed to get more information on the usage of sneakers by the respondents.

Figure 2a: Do you own a pair of sneakers

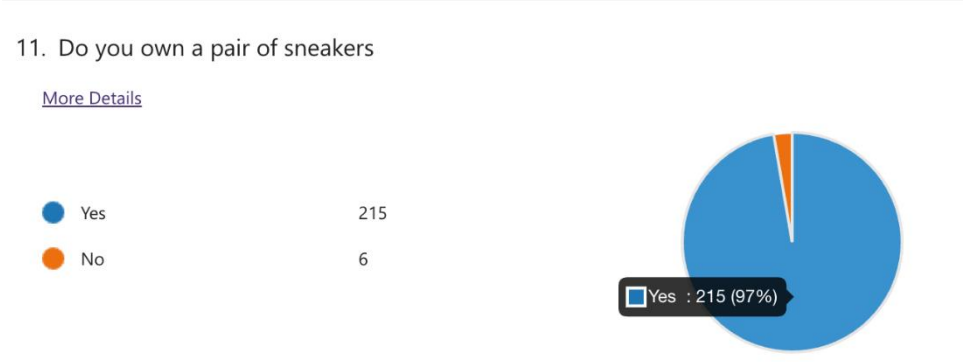

Figure 2 Do you own a pair of sneakers

Figure 3: How often do you wear sneakers

Figure 2&3: Sneaker/Shoe ownership & Shoes/Sneaker usage of respondents

3.8. Categorizing the Questionnaire

The questionnaire variants were categorized into two categories: single nudges and nudge combinations. This enabled looking into both 1) which individual nudge resulted in a more positive customer response and 2) which combination nudge resulted in a more positive customer response. The study was conducted using Microsoft Surveys, and all of the answers were from South Africa. An example questionnaire is shown in Figure 2.

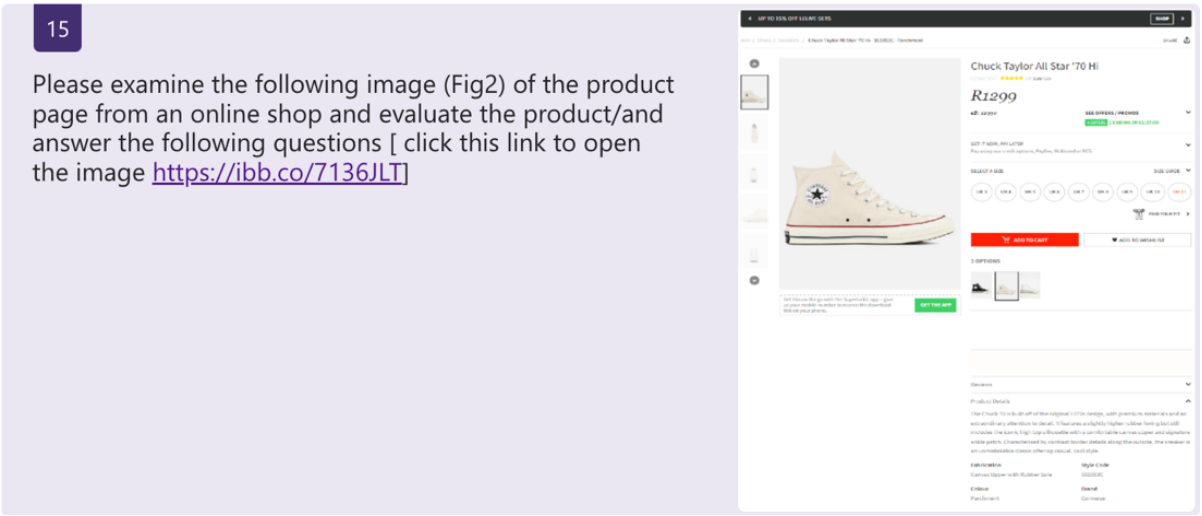

Figure 4 : Questionnaire example

3.9. Design of the base product page

The core of the study were the different variations of a mockup e-commerce product page that were shown to the respondents between questions 4 and 5. These variations included either i) no nudge, ii) one nudge, or iii) a combination of different nudges.
These nudges were designed by building an e-commerce website for the study. The chosen e-commerce website was Superbalist.com, which is a one of the widely used and trusted e-commerce website in South Africa. Moreover, within the ranking, Takealot and Superbalist are part of a larger multinational: Takealot Group. Between 2019 and 2022, their revenue increased significantly, reaching 827 million U.S. dollars. (Statistica, 2024)
This enabled the researcher to take screenshots of the product page and redesigned the wireframes based of existing Superbalist nudge variations allowing for a quick implementation of the desired product page.

However, apart from implementing various nudges on the product page the selected product and its descriptions remained the same across all nudge variations.

The goal of the study was to create as a standardized test as possible. This meant that the product chosen needed to be a common product that is found and used by most respondents in South Africa. In addition to that the above-mentioned product description needed to be neutral in tone to exclude its possible effect on the study. In other words, the product description did not include any kind of reference to the possible nudges that were present, as this would have skewed the results.

Sneakers were chosen as the target products. This is mainly because the clothing and shoes category is the most purchased category in e-commerce stores in South Africa. The fashion segment generated $523 million in revenue for South Africa's e-commerce market in 2021 and we needed a product that was of interest to the respondents, as the majority of them were below 30 years of age and had limited buying power. In South Africa, 61% of e-commerce users are between the ages of 25 and 54.(Gitnux.com)

Our target audience was familiar with the shoe brand, which brought some neutrality to respondents. Another possible product of choice is a smartphone for the same reason. However, as the respondents were from South Africa showing a specific brand of smartphone might have affected the results of the study (Kim et al., 2020; Cornelia & Pasharibu, 2020). In addition, choosing a widely known sneaker brand made it possible to "standardize" the product, meaning that there were no other brands visible in the variations.

The product description and the price for the product were taken from Superbalist product page, and brand names, more unique features, and other more brand/feature specific "marketing" language were edited away. The product description consisted of a short marketing description and detailed technical details. The purpose of the information was to create authenticity for the image variants, meaning that the end goal of the variants was to create a sense of screen capture from a real online shop even though the product page was tailored for the study.

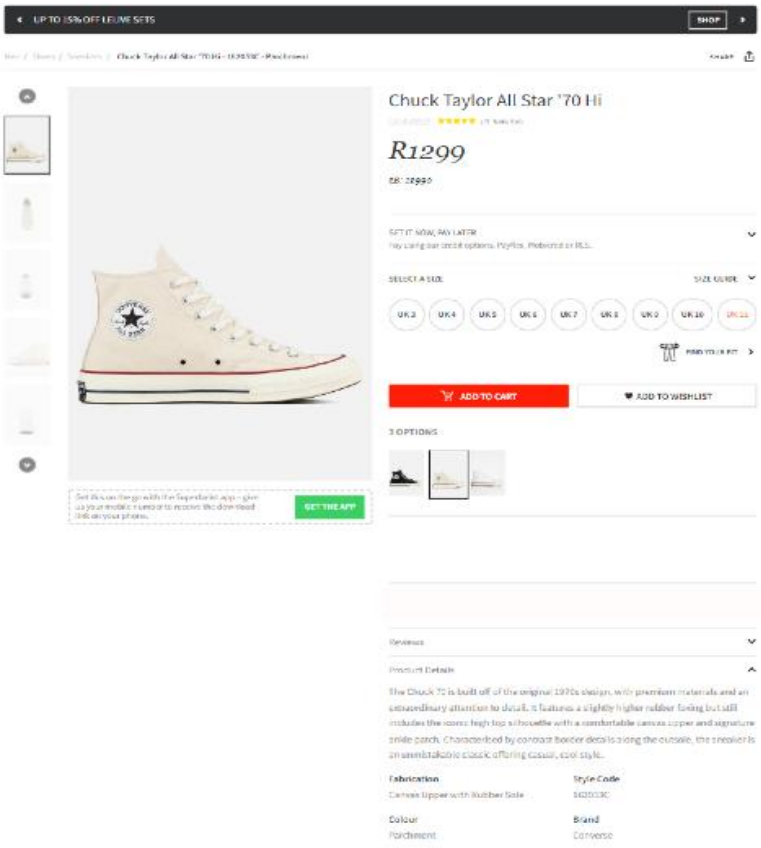

Figure 5 front-end design of product page without any nudges.

There are many other design elements on the product page, such as delivery and shipping information, return information, timed promotions, reviews, social icons and sharing, chat for customer support, and the menu hierarchy of the website. However, as shown in Figure 3, the end design of this study was stripped of extra elements. Through these and the previously mentioned design choices, the end result became clear. This was the goal, as this study was mainly interested in different popular nudges and how they affected users' responses. By stripping the images of extra elements, the nudge variant that was examined was easier for the user to notice.

3.10. Designing of Nudges

There were three unique nudges implemented to the design and three more combination nudges making a total of six nudge variants These were done by editing the Superbalist product page screenshots, allowing us to add different nudge variants to the product page,

3.11. Timed Promotions / Urgency Nudge

Timed promotions are widely used in South Africa e-commerce stores, PwC's South African Retail Sentiment Index for 2023 revealed that 99% of consumers say they are adopting behaviours that help them save money which includes delaying purchases until the items are on promotion. According to NielsenIQ's latest Price of Promoting report South African consumers are value conscious, with 31% actively searching for promotions while 22% will even change stores based on the discounts on offer. Therefore, the timed promotions nudge was implemented to trigger some sort of urgency on the part of the user. For example, a Superbalist offers timed promotions that can only be redeemed during a certain period.

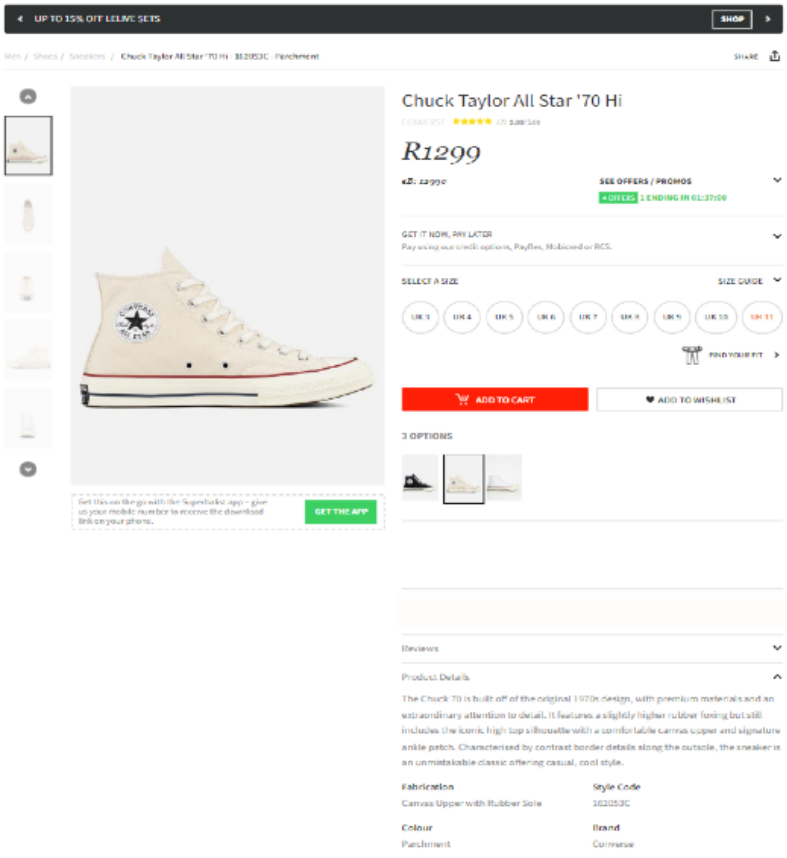

Figure 6 Timed Promotions/Urgency Nudge

3.12. Shipping Information Nudge

In Africa, businesses need to have a delivery system that can assist with delivering products to customers. Even in a country like South Africa where infrastructure and transportation networks are more developed, logistics is still a concern in South Africa (Hubbard 2015) Logistics systems, including both delivery services and traffic infrastructure, are preconditions to the development of e-commerce (Alyoubi 2015); The shipping nudge was implemented to provide information regarding delivery and shipping, it is best practice including delivery information as it usually helps with managing delivery expectations. “Free standard delivery, faster options available Free collection open 7 days a week”. The result of implementing the nudge in the experiment product page can be seen in Figure 7 below

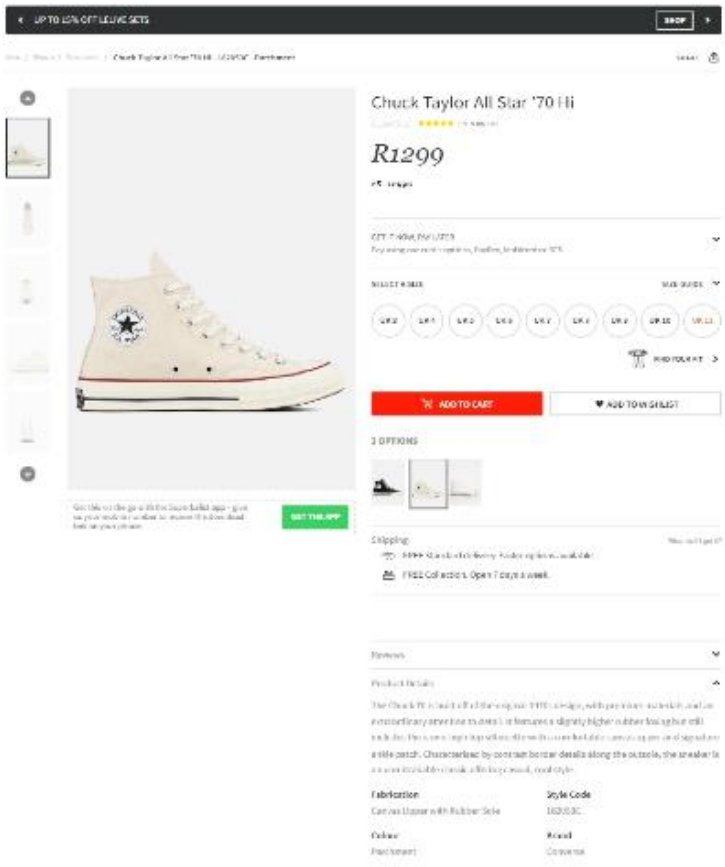

Figure 7

Figure 6: Shipping Information Nudge

3.13. Returns Information Nudge

Items bought online are returnable for reasons other than a change of mind; incorrect products, colours and defects are also of concern. Again, the process tends to be easier with the larger retailers such as Takealot.com, Makro and Shein, all of which have return processing functionality on the order management pages of their websites.This nudge informs users about returning a product after purchase. Considering trust concerns in South Africa it was important to test the effect of returns information as a nudge. “Free exchange or return within 30 days” The result of implementing the nudge in the experiment product page can be seen in Figure 7 below

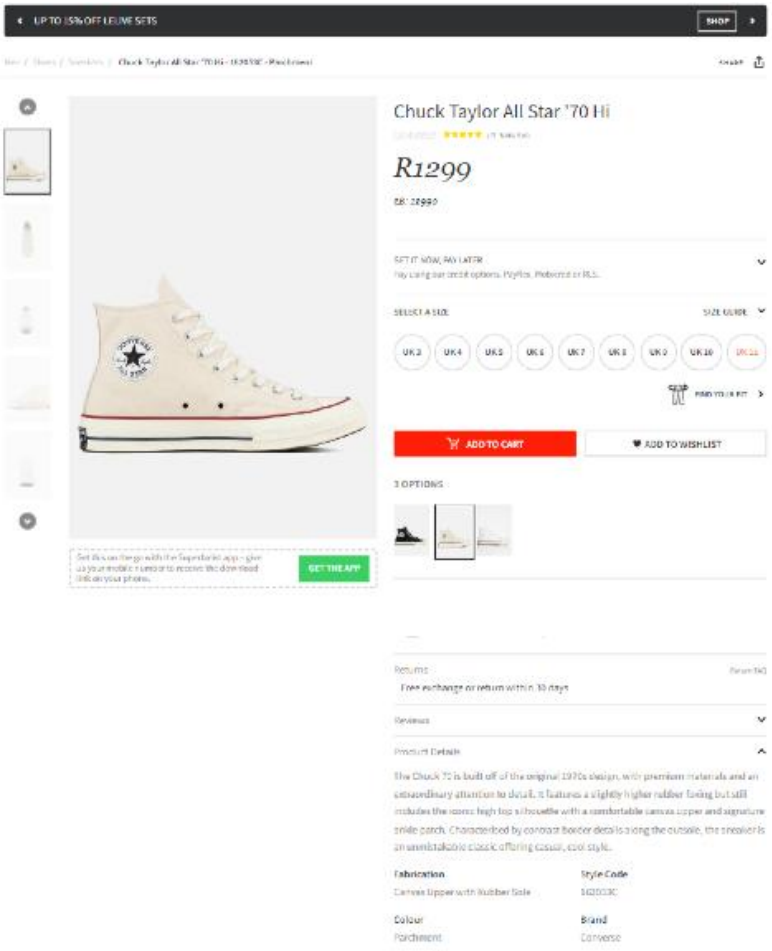

Figure 8 Returns Information Nudge

3.14. Combination Nudges

The last three nudge variants are combinations of the previously mentioned nudges. All settings and dimensions of the individual nudges were kept the same. These nudge images are available in appendix.

3.15. Data Analysis Techniques

Quantitative:

The data gathered in this study was analyzed primarily through quantitative measures and techniques because of the quantitative nature of the research instrument. The data collectedthrough Microsoft Surveys needed to be cleaned to remove potential anomalies, which was done using Microsoft Excel. The data cleaning process involved a rigorous analysis to reveal any invalid or incomplete data, the processes includes the need to ensure that all data is correctly filled in and that the data falls within the same range on the Likert scale. The need to understand the complexities of human experience and the role of meaning-making in a digital choice environment motivates the choice of an interpretivist epistemology for this study and the researcher employed Once the data was cleaned, it was then processed in Statistica to calculate Analysis of Variance, (ANOVA),

3.16. Limitations

Through the adoption of a survey strategy and the combination of a questionnaire, there is alimit to the number of questions that can be asked (Saunders et al., 2009), without becoming overbearing on the respondents, therefore knowledge gained can be regarded as limited to isolated points, which may not illustrate findings that will hold over a constant period of time.Questionnaires provide outcomes related to trends and attitudes but are not able to fully investigate and provide reasons for those outcomes (Beiske, 2002). Although a survey strategy is able to elicit information about factors relating to attitudes and perceptions, whichis difficult to measure through a more observational approach, the strategy merely provides estimates rather than exact measurements (Glasow, 2005).

3.17. Ethics and confidentiality

Ethics within research refers to the use of moral values when conducting, analyzing and communicating outcomes of a study (Myers, 2013). The researcher acknowledged the need for integrity and moral values within research (Bhattacherjee, 2012; Saunders et al., 2009). Therefore, the research instrument incorporated within this study, was first sent to the ethicscommittee at the University of Cape Town (UCT) for review, along with ethical application forms. Once ethical clearance was received, the data collection process began, whereby the questionnaire (see Appendix B) was complemented with a cover letter (see Appendix A), detailing the purpose of the study and that completing the questionnaire was considered a voluntary act.

All participants in this study were ensured that their responses were treated with anonymity, although demographical information such as age and gender were collected and used in an attempt to accomplish stipulated research objectives. The raw data collected was considered confidential, with only the researcher having possession and access to it. All the information and data collected within this study, were kept on the researcher's personal computer, which was protected by a password, while a backup was stored on the researcher'scloud storage (One Drive), safeguarded through the use of another password. This protectivestructure was maintained throughout the research process.

3.18. Time Frame

This study adopted a cross-sectional timeframe due to time constraints and the nature and aim of the study. Saunders et al. (2009) explains that a study must be considered cross- sectional when the proposed study is orientated around gaining an understanding of a present phenomenon (or phenomena) within a particular timeframe, whereby a one-year time period is mentioned. The cross-sectional timeframe was appropriate because of the amount of time the university affords a student to complete the Masters' program. The timeframe was aligned with best practice with regards to survey studies (Saunders et al., 2009). Below is a break-down of the various deliverable completion dates. The following section will explore the research analysis, findings and discussion

4. Research Analysis, Findings and Discussion

4.1. Introduction

This study adopted an interpretivist epistemological belief system. According to the interpretive approach, it is important for researchers as social participants to understand the differences that exist between people (Saunders et al., 2012). Interpretations'- also known as interpretive, involve researchers explaining the elements of research, so the researcher who do interpretive research incorporate their subjective notions and beliefs into research because they believe that through the exploration of human language, the meanings can be understood and shared in qualitative research (Myers, 2008; Carey, 2012). Interpretive researchers see social truth as embedded of their social surroundings and it's far not possible to summary from it due to the fact they "explain" truth through a method of "understanding" in place of a hypothesis trying out method with the aid of using and integrating the participants' subjective experiences, notions and beliefs of their respective social and cultural context (Rehman and Alaharti, 2016; Shah et al., 2013; Bhattacherjee, 2012). As interpretive analysis is encompassing and circumstantial, but not reductionist and isolationist, this allows the researchers to provide interpretive explanations which tend to focus on language, signs, and meaning from the perspective of participants participating in social phenomenon (Black, 2006; Bhattacherjee, 2012).

This research is following the definition of an interpretivist epistemology as it seeks to understand the effect of digital nudges on the users of e-commerce websites, by integrating the research participants subjective experiences in the study and employing analysis of variance to understand the various underlying behavioural effects on each participant.

To achieve the purpose of this research, the researcher used an online questionnaire as the research which was constructed and administered to e-commerce users within South Africa. The questionnaire, as described by Sreejesh (2014), is fundamentally a structured series of questions presented to respondents during an interview, accompanied by clear instructions detailing the sequence and selection criteria. Online questionnaires offer easy dissemination and access to a younger demographic and respondents also enjoy the flexibility of completing the survey

Mathers et al. (2007), highlights that during the questionnaire development process, various factors must be considered, including the method of administration (e.g., self-completion, face-to-face, telephone), respondents' literacy levels, expected response rates, available resources, and the characteristics of the target population. In this study, the researcher asked a set of demographic questions and other nudge related questions.

As previously established in section 3.4.2, a meaningful sample size of 222 or greater was required to achieve a 95% confidence level (Qualtrics, 2019). A total of 222 questionnaire responses were received. All 222 responses were valid during the analytical phase.

To administer the online questionnaire, the researcher used an online survey link which was distributed via the University of Cape Town mass email with clear instructions of completing the questionnaire. Once the questionnaire was distributed to the sample population, the researcher physically monitored the first responses to gather feedback on the instrument. This initial phase became the pilot study which targeted the first 20 responders feedback upon release of the research instrument. It was at this phase where it became apparent that some respondents failed to answer some of the questions as they could not see the images clearly. This called for a deactivation of the online survey link to make some design adjustments, which allowed for the images to be clearly viewed, after which the instrument was activated. Settings were also added to ensure that the respondents knew they had to answer all questions before submission. Incomplete questionnaires were deemed unacceptable for data analysis.

The initial phase of data analysis involved the systematic organization and cleansing of the questionnaire data, which encompassed seven distinct variants. Subsequently, the decoding of dummy variables was implemented within the dataset, resulting in an additional seven dummy variables, each corresponding to an individual nudge or combination of nudges. The analytical procedures were categorized into two groups: those focusing on a single nudge, and those examining combinations of nudges.

The analysis employed two different software tools: Excel and Statistica data analysis, facilitating means, , two-way ANOVA, Tukey's test and correlation. To validate this result statistically, the researcher conducted an analysis of variance (ANOVA) using the variables, perceived quality, consideration to buy and interest to buy the specific product, as the dependent variables and the nudge types as the independent variable. This yields a statistically significant difference between the contexts (F value 6., p- value < 0.005). Next, we turn to the effect sizes per nudge category (see Table 5 and Fig. 11). It becomes apparent that each nudging category

has a different effect size. Thereby, especially for the nudge shipping information, timed promotion nudge and the combination nudge of timed promotion + shipping information have larger median and average effect sizes than other nudges. For the other categories, the median and average effect sizes are closer together.

4.2. Responses by Variant

There were 222 responses between the variants, and the division between the variants was as follows:

Table 4 Responses by Variant

Nudge Type	Responses
No Nudge	220 responses
Timed Promotions (Urgency Nudge)	213 responses
Shipping Information	202 responses
Returns Information	205 responses
Combination Nudge (Urgency Promo+ Shipping/Delivery Info+ Returns)	202 responses
Combination Nudge (Shipping Info + Returns)	207 responses
Combination Nudge (Urgency Promo + Shipping Info)	208 responses

It is important to note that for each nudge type 3 from the table above, dependent variable questions were asked, which are.

- I believe this product is of high quality
- would consider buying a Converse pair of sneakers as my new pair of sneakers
- Are you interested in buying these sneakers if you saw them in an online store

4.3. Demographic Information of Respondents

Figures 7-10 show the respondents' demographic information. The sample size and variance between the nudge variants were relatively similar to those of the whole population. The respondents were mainly Gen Z and some Millennials, with most responses coming from the age groups 18–30. Approximately 64% of the respondents were female and 35% were male. 63% of the respondents held a high school diploma, and 36% held a bachelor's degree and above. The income distribution shows that 88% of respondents earn less than R100000/ year. Refer to figure 7,8,9&*10*

Moreover, it is important to note that having these questions in the questionnaire made it possible to perform basic checks on the sneaker usage amongst the respondents to ensure that most of the respondents owned a sneaker and wore it regularly. As shown in Figure 1, 97% of the respondents owned a pair of sneakers, and only 3% did not own sneakers. 93% of the respondents said they somehow wear sneakers.

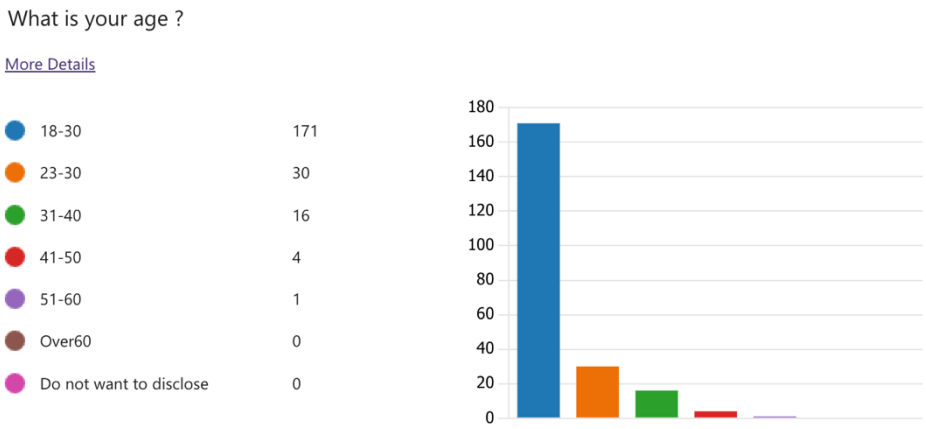

Figure 9 Age of Respondents

What is your sex

More Details

Male	78
Female	141
Other	2
I do not wish to disclose	1

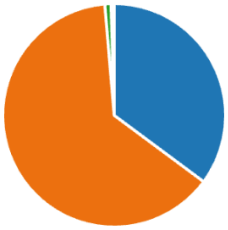

Figure 10 Gender of Respondents

What is your highest level of education

More Details

High School	140
Bachelor degree or similar	63
Master degree or similar	17
PhD	1
Do not want to disclose	1

Figure 11 Education of Respondents

What is your annual income

More Details

Below R100 000	195
R100 000 – R200 000	6
R200 000 – R400 000	7
R500 000 – R750 000	7
R1000 000 and above	6

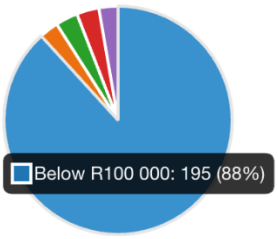

Figure 12 Income of Respondents

4.4. Averages

The primary metric assessed was the mean response, in numerical terms, to inquiries related to the dependent variable. The findings were categorized into single-nudge and combination-nudge groups, as illustrated in this and subsequent sections.

4.5. Single Nudges

According to Table 5, when there are no nudges, customer response tends to be lower across all questions. As mentioned before, in section 3.6 we expected only slight numerical differences between the variants because of the way the answers were measured and the design of the nudges.

The findings indicate that using a shipping information nudge leads to the best customer response. The average scores were consistently higher or at the highest level for all the questions. Another nudge that receives a strong customer response is the timed promo/urgency nudge, although it is more positive overall, except for Q8 – interest to buy. The results for the return information nudge are interesting because they vary the most among the questions we asked. However, when looking at all the questions, it still resulted in a better customer response compared to the variant without any nudges.

Table 5 shows averages for single Nudges

Dependent Variable	No Nudge	Urgency Nudge/ Timed Promotions	Shipping Information	Returns Information
I believe this product is of high quality?	2.6	2.7	2.8	2.6
I would consider buying a new pair of sneakers.	2.9	3.0	3.1	2.9
Are you interested in buying this product if you saw it in an online store?	2.4	2.5	2.5	2.3

4.6. Combination Nudges

The results seem to indicate that it is better to include nudges on a product landing page than not include them, as no nudge variant receives the lowest averages to nearly all dependent variable questions. They also show that Shipping Information is an extremely strong nudge for producing a more positive customer response. Interestingly, timed promotions, which can be considered as too pushing, or even 'evil' with Lavi's (2018) definition, seems to positively affect the customer response to the product. Finally, returns information seems to have little effect on any measured variable, as the results are very close to the no-nudge variant.

Table 6 shows averages for Combination Nudges

Dependent Variable	**No Nudge**	**Urgency Nudge/ Timed Promotions + Shipping + Returns**	**Shipping Information + Returns Information**	**Timed Promo + Shipping**
I believe this product is of high quality?	2.6	2.65	2.7	2.8
I would consider buying a new pair of sneakers.	2.9	3.0	3.1	3.18
Are you interested in buying this product if you saw it in an online store?	2.6	2.4	2.5	2.58

Table 6

The figure 13 below indicates slight significance between variables.

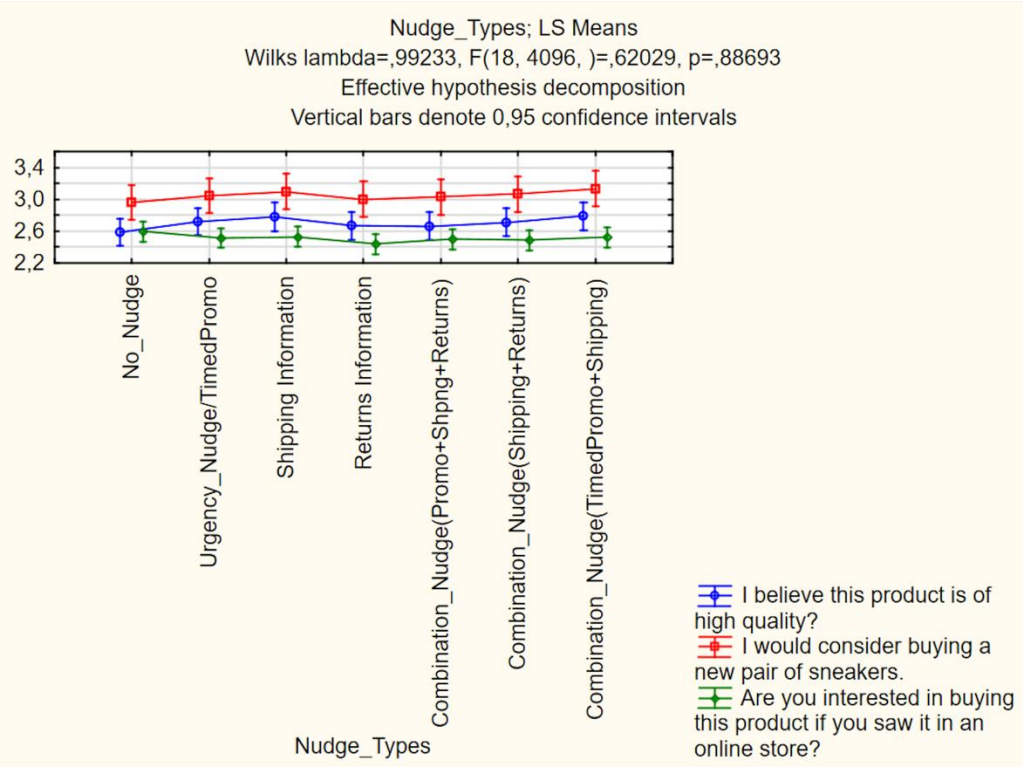

Figure 13

4.7. ANOVA and Turkey Test

A one-way between - subjects ANOVA was used to determine if there are significant differences in means between two or more independent groups which in this context was nudge types. It's essentially an extension of the independent-samples t-test, allowing researchers to compare more than two groups simultaneously. Once ANOVA reveals a significant difference, post-hoc tests (like Tukey's HSD) are conducted to determine which specific pairs of groups have statistically different means.

Descriptive Statistics

Table 7: Oneway Anova results on percieved quality

Nudge_Types	I believe this product is of high quality? Mean	I believe this product is of high quality - Std.Err.	I believe this product is of high quality - 95.00%	I believe this product is of high quality +95.00%	N
1	2,586,364	0,086317	2,417,045	2,755,682	220
2	2,718,310	0,087723	2,546,231	2,890,388	213
3	2,782,178	0,090080	2,605,477	2,958,880	202
4	2,668,293	0,089419	2,492,889	2,843,697	205
5	2,663,366	0,090080	2,486,665	2,840,068	202
6	2,710,145	0,088986	2,535,590	2,884,700	207
7	2,788,462	0,088772	2,614,327	2,962,596	208

Table 8 : Oneway Anova results on interest to buy a new pair

Nudge_Types	I would consider buying a new pair of sneakers? Mean	I would consider buying a new pair of sneakers? - Std.Err.	I would consider buying a new pair of sneakers? - 95.00%	I would consider buying a new pair of sneakers? +95.00%	N
1	2,959,091	0,110121	2,743,078	3,175,104	220
2	3,042,254	0,111916	2,822,720	3,261,787	213
3	3,099,010	0,114922	2,873,578	3,324,442	202
4	3,000,000	0,114078	2,776,224	3,223,776	205
5	3,029,703	0,114922	2,804,271	3,255,135	202
6	3,067,633	0,113526	2,844,940	3,290,326	207
7	3,134,615	0,113253	2,912,459	3,356,772	208

Table 9: : Oneway Anova results on interest to buy online

Nudge_Types	Are you interstd in buying this product is you saw it in an online store? Mean	Are you interstd in buying this product is you saw it in an online store?- Std.Err.	Are you interstd in buying this product is you saw it in an online store?- 95.00%	Are you interstd in buying this product is you saw it in an online store? +95.00%	N
1	2,595,455	0,062875	2,472,119	2,718,790	220
2	2,516,432	0,063900	2,391,086	2,641,778	213
3	2,529,703	0,065617	2,400,989	2,658,417	202
4	2,439,024	0,065135	2,311,256	2,566,793	205
5	2,500,000	0,065617	2,371,286	2,628,714	202
6	2,487,923	0,064819	2,360,773	2,615,073	207
7	2,524,038	0,064663	2,397,195	2,650,882	208

Table 10 ANOVA results on variables

Variables	SS effect	Df effect	Ms effect	SS Error	Df Error	MS Error	F	p
Quality	**7,169378**	**6**	**1,194896**	**2401,713**	**1462**	**1,642758**	**0,727372**	**0,627586**
Consideration	4,936519	6	0,822753	3897,911	1460	2,669802	0,30817	0,932932
Interest to buy	2,705454	6	0,450909	1270,495	1463	0,868417	0,519231	0,794112

Variable1, Perceived Quality = I believe this product is of high quality

Variable 2, Product Consideration = I would consider buying a new pair of sneakers

Variable 3, Interest to buy online = Are you interested to buy this product if you saw it in an online store

ANOVA uses the F-test, and compares the ratio of the Mean squares explained by the Nudge Types Effect to the "Mean squares for Error", which is a measure of the general variation in the data
If the F-ratio is bigger than a pre-determined cutoff point, we reject H0. In this case the F-ratio is only 0.62, and p is 0,8869, so nudge types do not have a significant effect, and we accept H0.

The purpose of this analysis was to determine the effect of digital nudges on the users of e-commerce websites in South Africa. The collected data were analyzed using between-subject one-way ANOVA. It was hypothesized that the presence of a nudge on an e-commerce website will lead to positive effect on the users of e-commerce websites in South Africa. The results revealed there is an effect of digital nudges on the users of e-commerce websites in South Africa.

A comparison of means to dependent variable questions between nudge variants was the focus of this study. Hence, it is crucial to examine the potential statistical significance of the variations among these variants. For this purpose, two types of analyses were performed: one-way ANOVA and Tukey's test. ANOVA helped determine whether a noteworthy difference existed between the groups, while Tukey's test delved into how customer responses varied across these groups. The Appendix contains a comprehensive dataset of Tukey's test results.

4.8. Tukey Test

The Tukey HSD ("honestly significant difference" or "honest significant difference") test is a statistical tool used to determine if the relationship between two sets of data is statistically significant – that is, whether there's a strong chance that an observed numerical change in one value is causally related to an observed change in another value. In other words, the Tukey test is a way to test an experimental hypothesis. The Tukey test is invoked if the interaction among three or more variables is mutually statistically significant, which unfortunately is not simply a sum or product of the individual levels of significance. The study utilized the Tukey's test to compare the differences between means of values rather than comparing pairs of values. The value of the Tukey test is given by taking the absolute value of the difference between pairs of means and dividing it by the standard error of the mean (SE) as determined by a one-way ANOVA test. The SE is in turn the square root of (variance divided by sample size) (Holm, 1979).

Descriptive Statistics

Turkey HSD test Variable: I believe this product is of high quality.

Marked differences are significant at p<0,5000

Table 11 Turkey HSD results

Nudge Types	M=2,5864	M=2.1750	M=2,8107	M=26763	M=2,6796	M=2,7163	M=2,7885
1		0,943515	0,544498	0,991117	0,98932	0,942575	0.662527
2	0,943515		0,988159	0,99993	999959	1.000000	0,997142
3	0,544498	0,988159		0,938231	0,9453	0,989443	0,999997
4	0,991117	0,99993	0,938231		1.000000	0,999917	0,974004
5	0,98932	0,999959	0,9453	1.000000		0,99995	0,977771
6	0,942575	1.000000	0,989443	999917	99950		0,99753
7	0,662527	0,997142	0,999997	0,974004	0,977771	0,99753	

The lowest p value here is that between Nudge 2 and Nudge 3 (p= 0.5444). This shows that any differences in the sample means are not big enough relative to their standard deviations for us to conclude that there are significant differences in their respective populations.

4.9. Box and Whisker Plots

This study utilized one way ANOVA coupled with Box and Whisker plots to investigate the relationships between seven nudges independent variables and three dependent variables. The results indicate significant variations in the means of the dependent variables across different levels of the independent

variables. These findings contribute to our understanding of the multifaceted interactions between variables and underscore the importance of comprehensive statistical analyses in research. The diagrams below illustrate the variations, refer to figure 14, 15, 16.

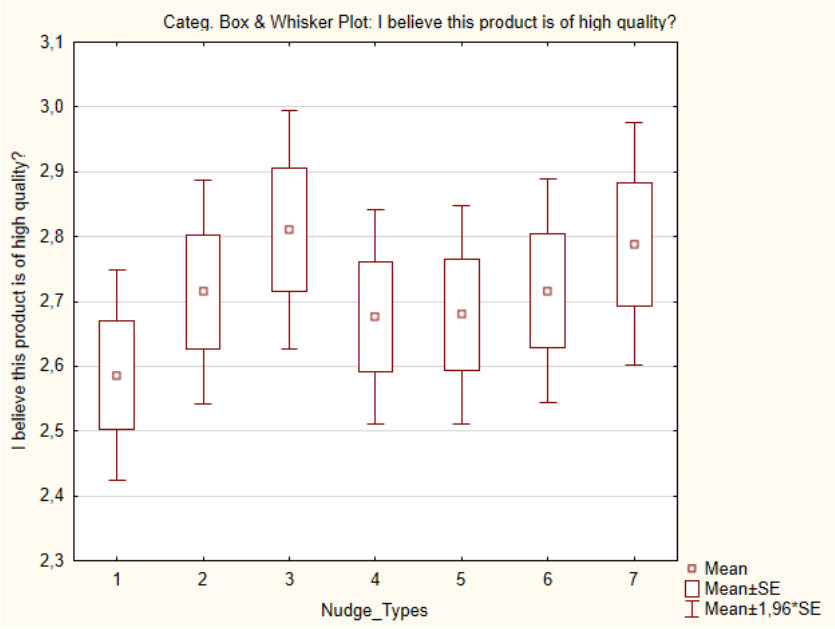

Figure 14: Variable 1 (Perceived quality)

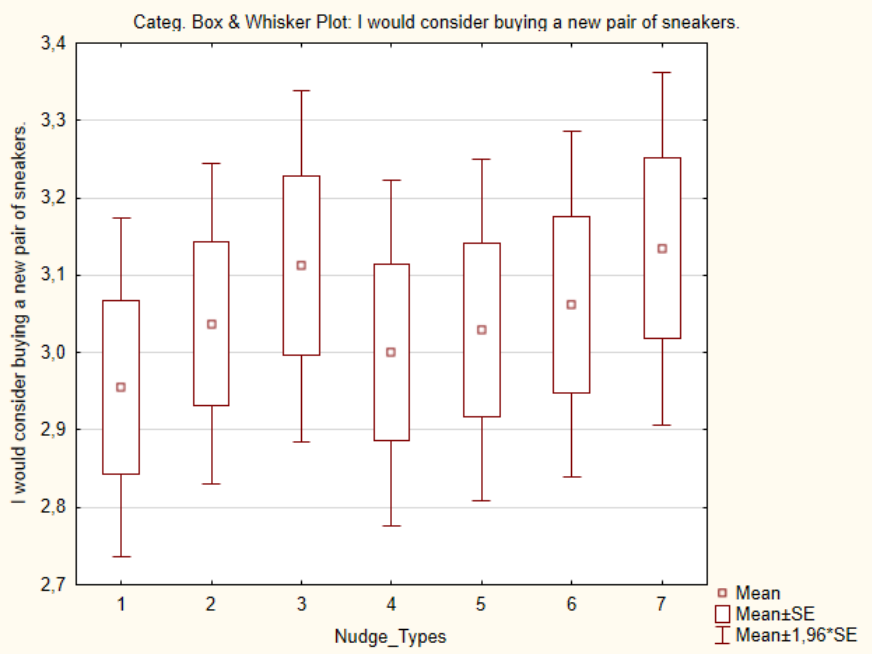

Figure 15: Variable 2 (product consideration)

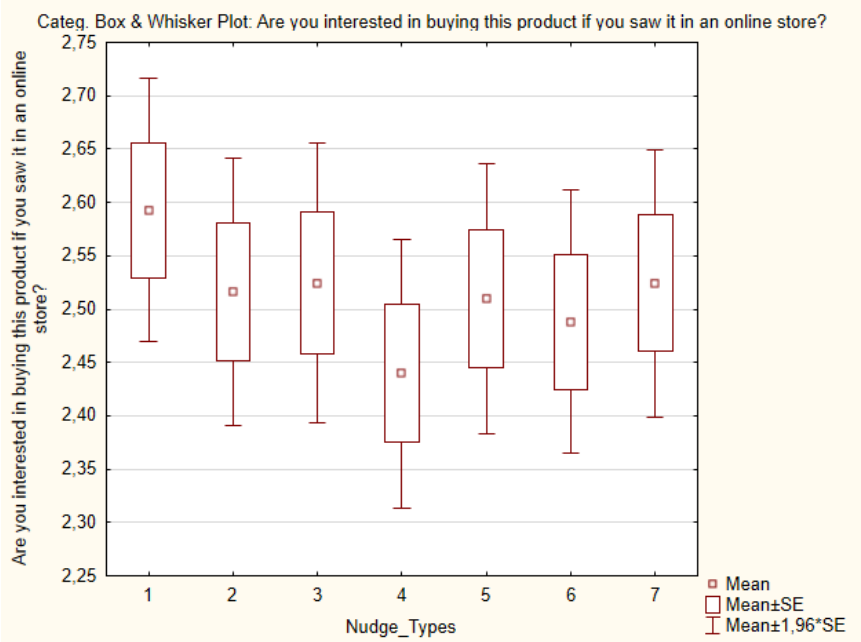

Figure 16: Variable 3 (Interest to buy online)

4.10. Correlations

Due to the already low variances across all dependent variable questions (Q5 – _Q8), the expectation was that correlations between nudge variants and dependent variable questions would be low, and they were. This study utilized correlation scatter plots to investigate the relationships between seven independent variables and three dependent variables. The results revealed significant associations between the variables, contributing to our understanding of their interplay and implications for further research. The visual representations offered by scatter plots proved instrumental in elucidating these relationships, underscoring the value of both statistical analysis and data visualization techniques in research endeavours. Future studies could explore additional variables or employ advanced statistical methods to delve deeper into the complexities of the relationships observed in this study. Refer to fig 17, 18 and 19.

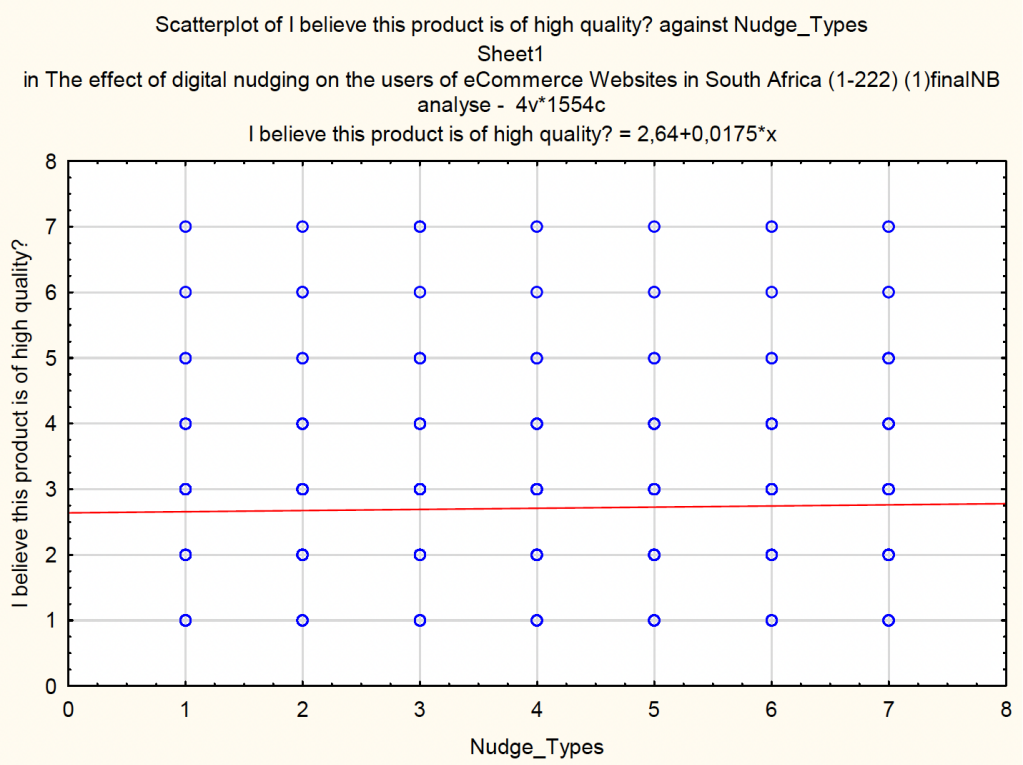

Figure 17: Scatterplot for variable 1 (percieved quality)

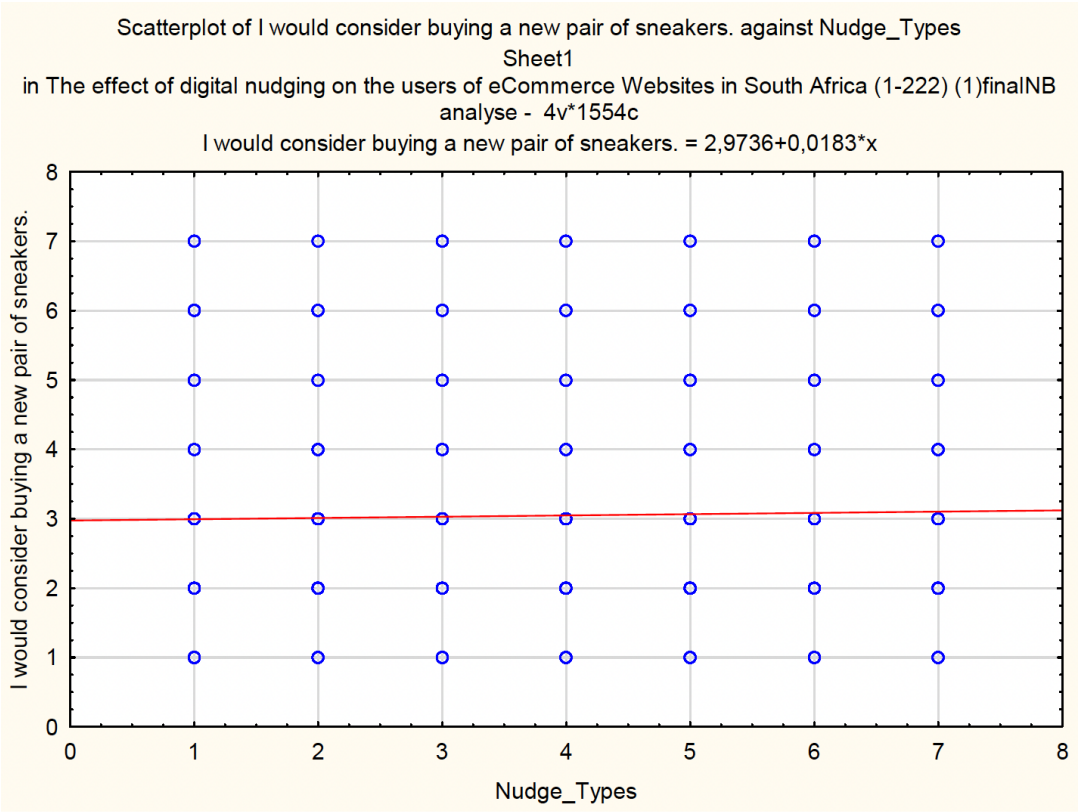

Figure 18: Scatterplot for variable 2 (product consideration)

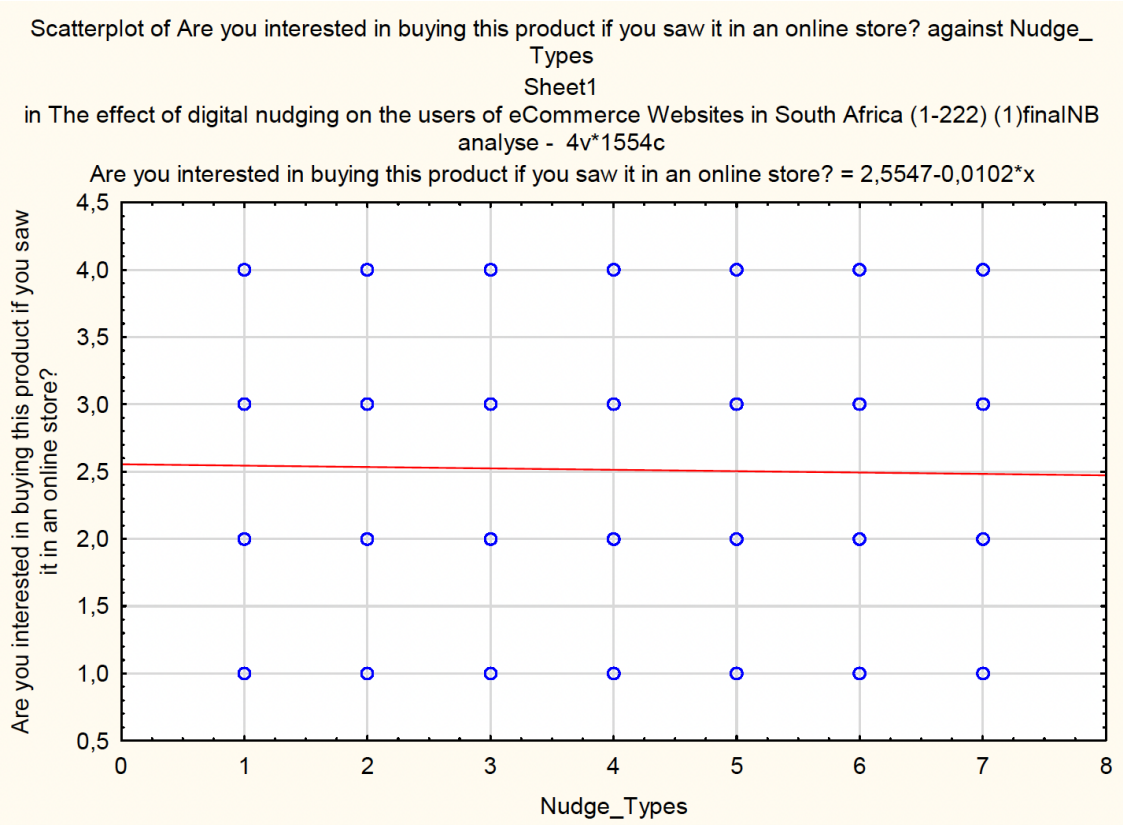

Figure 19: Scatterplot for variable 2 (Interest to buy online)

4.11. Comparison of results to hypothesis

The hypotheses outlined in Table 7 are presented in chapter two. This table is followed by an explanation of the results.

Table 12: Hypothesis Table

	Hypothesis	**Results**
H_1	The absence of a digital nudge on an e-commerce website, i.e., returns information, shipping information, etc., could lead to a less positive customer response than the presence of a nudge.	Partially Supported
H_2	The presence of a digital nudge on an e-commerce website, (i.e., timed promotions/Urgency nudge) leads to a more positive customer response than the absence of a nudge.	Partially Supported
h3	The presence of a digital nudge on an e-commerce website, (i.e., Shipping information) leads to a more positive customer response than the absence of a nudge.	Partially Supported
h4	The presence of a digital nudge on an e-commerce website, (returns information) leads to a more positive customer response than the absence of a nudge.	Partially Supported
h5	The combination of nudges on an e-commerce website, (i.e. timed promotions + shipping information + returns information) led to more positive customer responses than the individual nudges.	Partially supported
h6	The combination of nudges on an e-commerce website, (i.e. returns information + shipping information) led to more positive customer responses than the individual nudges.	Partially Supported
h7	The combination of nudges on an e-commerce website, (i.e. returns information + shipping information) led to more positive customer responses than the individual nudges.	Partially Supported
H8	Customers' responses to different nudge variants are different on a statistically significant level.	Partially Supported

H1: The hypothesis was partially supported for the no nudge variant. Even though the no nudge variant had the lowest customer response to most of the dependent variable questions, the no nudges variant also had the highest response for the variable question (Are you interested in buying this product if you saw it in an online store). The results of the experiment demonstrated a statistically insignificant positive response in the average cases in which participants selected this nudge (no nudge) when calculated at a confidence interval of 95%; therefore, they rejected the alternate hypothesis and accepted the null hypothesis.

H2 The hypothesis was partially supported for the presence of a nudge variant, Urgency nudge/ timed promotions. Even though this nudge variant had a high customer response in some cases the Urgency nudge variant had a lower customer response than the no nudge variant on the dependent variable (Are you interested in buying this product if you saw it in an online store). The results of the experiment have demonstrated a statistically insignificant positive response in the average cases in which participants selected this nudge (urgency nudge \timed promotions) when calculated at a confidence interval of 95% and therefore reject the alternate hypothesis

H3 The hypothesis was partially supported for the presence of nudge variant shipping information. Even though this nudge variant had a high customer response in some cases, the Shipping information nudge variant had a lower customer response than the no nudge variant on the dependent variable (Are you interested in buying this product if you saw it in an online store).The results of the experiment have demonstrated a statistically insignificant positive response in the average cases in which participants selected this nudge (shipping information) when calculated at a confidence interval of 95% and therefore reject the alternate hypothesis

H4 The hypothesis was partially supported for the presence of nudge variant returns information. Even though this nudge variant had a high customer response in some cases, the returns information nudge variant had a lower customer response than the no nudge variant on the dependent variable (Are you interested in buying this product if you saw it in an online store). The results of the experiment have demonstrated a statistically insignificant positive response in the average cases in which participants selected this nudge (returns information) when calculated at a confidence interval of 95% and therefore reject the alternate hypothesis

H5 The hypothesis was partially supported, for the presence of combination nudge variants. Even though this combination nudge (Timed Promo + Shipping Information + returns information) had a high customer response in some cases, the combination nudge (Timed Promo + Shipping

Information + returns information) variant had a lower customer response than the no nudge variant on the dependent variable (Are you interested in buying this product if you saw it in an online store) The results of the experiment have demonstrated a statistically insignificant positive response in the average cases in which participants selected this combination nudge (Timed Promo + Shipping Information + returns information) when calculated at a confidence interval of 95% and therefore reject the alternate hypothesis

H6 The hypothesis was partially supported, for the presence of combination nudge variants. Even though this combination nudge (Shipping Information + returns information) had a high customer response in some cases than the no nudge variant. The combination nudge (Shipping Information + returns information) variant had a lower customer response than the no nudge variant on the dependent variable (Are you interested in buying this product if you saw it in an online store) The results of the experiment have demonstrated a statistically insignificant positive response in the average cases in which participants selected this combination nudge ((Shipping Information + returns information)) when calculated at a confidence interval of 95% and therefore reject the alternate hypothesis

H7 The hypothesis was partially supported, for the presence of combination nudge variants. Even though this combination nudge (Timed promo + Shipping Information) had a high customer response in some cases than the no nudge variant. The combination nudge (Timed promo + Shipping Information) variant had a lower customer response than the no nudge variant on the dependent variable (Are you interested in buying this product if you saw it in an online store). The results of the experiment have demonstrated a statistically insignificant positive response in the average cases in which participants selected this combination nudge (Timed promo + Shipping Information) when calculated at a confidence interval of 95% and therefore reject the alternate hypothesis

H8 Tukey's test showed some group averages to be statistically significant. However, most group comparison results were not statistically significant, so the hypothesis is partially supported and we reject the alternative hypothesis

4.12. Theoretical background to explain the results.

To explain the effectiveness of digital nudging and the high variation between nudge variant results. This study looked at other previously conducted studies into the possible reason for the variation. In spite of instances showcasing the efficacy of nudging strategies, it is imperative to acknowledge the potential instances wherein the application of nudges may not yield the anticipated outcomes (Sunstein, 2017a). The variability in the effectiveness of nudges is exemplified by situations where a particular type of nudge may exhibit success in one context yet prove ineffective in another. A salient illustration pertains to the deployment of defaults—a paradigmatic and resilient form of nudging. The seminal work by Johnson and Goldstein (2003, 2004) stands as pioneering contributions in demonstrating the efficacy of defaults, utilizing an online experiment and cross-national data to underscore the significant elevation in organ donation rates within contexts where the default option entails individuals being organ donors, as compared to those where the default is otherwise. Subsequent research has consistently corroborated the effectiveness of defaults across diverse studies and sectors (e.g., Bruns et al., 2018; Cronqvist et al., 2018; Jachimowicz et al., 2019; Venema et al., 2018; Wynes et al., 2018).

Another explanation of the results might be pressure cues. Purchase pressure cues are used to motivate customers to complete a purchase by signaling them that either time left for a deal or availability of a product are limited. We are constantly surrounded by sale events and reduction offers, special deals, hot deals, etc. Prominent examples that include scarcity are e.g., deal of the day offers and warnings like “In high demand - only 1 room left!” at booking.com or the countdown clock at eBay. Amirpur and Benlian (2015) have found that limited time pressure cues increased the probability to choose an option, while limited availability did not have such an effect. One possible explanation is that while limited product availability heightens the value of a product in offline settings (Byun and Sternquist 2012), it does not to have the same credibility online. Thus, we focus on time-related pressure in our study, as it has been proven to be an effective online nudging technique. This study used a similar pressure cue nudge, the timed promotion nudge, and the possible nudge variations could have influenced the respondents.

Another explanation could be that personality is an influencing factor. Oyibo and Vassileva (2019) discuss the relationship between the Big Five personality traits and susceptibility to social influence, which is closely related to conformity nudges investigated in this research. The results of their questionnaire showed that high neuroticism was the most consistent predictor of susceptibility to social influence. The authors studied three forms of social influence: social learning, proof, and comparison. Social proof is the type of social influence that conformity nudges in e-commerce are designed to have. Oybo and Vassileva write that low Openness to Experience and low Conscientiousness increase susceptibility to social proof. This study did not use social proof-related nudges such as reviews that are closely related to personality traits; therefore, a comparison with this study is challenging.

There are a few studies on the influence of basic demographic variables, such as gender or country. A recent example of this is a study by Mohr et al. (2019) on the influence of sex on the efficacy of nudges used in fast food order processes with the aim of decreasing calorie intake. However, it is challenging to see the effects of these variables because the respondents were mainly from South Africa.

Another explanation for the results may be the respondents' age. Esposito et al. (2017) find in their study that the effect on different nudges might vary depending on the age of a user. They noted an interaction effect between all nudges used in the study and age. Two nudges exacerbated the effect of age, whereas the other mitigated it. In this study, over 80% of the respondents were aged 18 to 30, so it is possible that the differences between the nudge variants might have been influenced by the age profile of the respondents in this study.

An important factor to consider when analyzing the results is that this thesis expected the numerical differences in the results to be relatively small. This can be explained through the study by Hummel and Maedche (2019), who showed that digital nudges have a median effect of 21% and that only 62% of nudging experiments are statistically significant. This was true for this study as well, to a degree. This study found only six total nudge groups, which had statistically significant average differences for the three dependent variable questions, although the small sample sizes might have contributed to this. A small median effect was also observed in the results.

Other factors for the variation in results, in some studies, found price and brand loyalty to be deciding factors when choosing to buy a product online. Furthermore, one aspect that might reduce the effectiveness of digital nudging is individual preferences that already exist prior to being

exposed to a nudge (Sunstein, 2017). Amongst other things, brand loyalty, price, and insufficient level of knowledge where some of the factors identified by Wiederhold and Martinez (2018) and Sunstein (2017), that these individual factors seem to be having a stronger impact on purchase decisions than nudges. This could have been the reason why some respondents did not choose to buy the product if they found it in an online store.

The context of the research has an influence on the results in that, for example, If users are aware of specific nudging elements used in an e-commerce site, this awareness will also shape their attitudes about the persuasion strategy used by the respective designers (Friestad and Wright 1994). In this study particularly, the participants of the study were not aware of the presence of nudges on the e-commerce website. Another factor leading to these results could be the design and placing of the nudges on the purchasing screen. According to (Tatler,2007) Humans tend to give higher visual attention to the middle of a computer screen, irrespective of other image features and often start information processing from the centre (Tatler 2007). One possible explanation why the (visual) central fixation bias leads to a higher probability to choose a product placed in the centre is that "the more the individuals look at a stimulus, the more they like it" (Atalay et al. 2012, p. 851). Perhaps, a change in the design and repositioning of the digital nudge could result in differing results. One of the limitations of this study points to poor visual quality of the e-commerce website mock-ups used in the questionnaire.

Social bias nudges like online consumer reviews and ratings of products are widely used and significantly influence consumers purchase decisions (Babić Rosario et al. 2016). Because of that, they have attracted high attention from both researchers and marketers. Customers do not have to solely rely on advertising messages to acquire information about products anymore, but they can include online reviews of other buyers in their decision-making process. However this study did not include any social bias nudges. Burnkrant and Cousineau (1975, p. 214) have demonstrated the effect of informational social influence in shopping situations and concluded that "people use others' product evaluations as a source of information about the product". Influenced by positive ratings of others they perceive a product to be better.

In conclusion, the theoretical background helps explain the results to a certain degree. However, to fully understand the results, a deeper analysis, variant by variant and by taking into account the respondent age and other above-mentioned factors, would need to be made. In this study, this was not possible because of the relatively low response count for each variant.

In this study, another issue that might have affected the results, was the overall look and feel of the mock-up e-commerce website interface page. The mock-ups were poorly designed and the images used where pixelated which might have affected participants visibility. Previous research by B.J. Fogg , 2003 acknowledges that visually appealing website has significant effect in attracting users' attention and trust. The look and feel of a website involves a combo between aesthetics and functionality, where choices in typography, color, layout, and interactive elements are not just about beauty but about creating intuitive pathways for users to navigate and interact with content effortlessly. Thus, website look and feel helps the site capture the visitor's attention through visual appeal and offer a seamless user experience at the same time. Este.co, (2024)

In summary, it would seem that – contrary to much extant literature – digital nudging alone cannot and does not influence consumers' purchase decisions in the context of e-commerce fashion category products. Consumers' decision processes are significantly more influenced by cognitive factors such as the shoe item's price, material, and appearance. Different consumers have different preferences and values for each of these preferences, with a different weight. In addition, these preferences may vary among shoe items. Despite this, consumers might follow the recommendation of a nudge if none of their individual preferences clearly elevate one clothing item over the other, and therefore choose in accordance with the nudge recommendation.

5. Discussion

This chapter summarizes the research questions outlined in the introduction of this thesis and briefly summarizes the answers to those questions. The paper then outlines the theoretical and practical contributions of this study. Finally, this chapter offers suggestions for future research and outlines the limitations of the study.

5.1. Summary of research question and answer

The thesis aimed to answer one main question with four sub-questions

Research Question: What is the effect of digital nudges on online customers purchasing in South Africa?
Sub -question 1: what is the effect of digital nudge 1(*timed promotions/urgency nudge*) on online customer purchasing in South Africa
Sub-question 2: What is the effect of digital nudge 2 *(shipping information)* on online customer purchasing in South Africa
Sub-question 3: What is the effect of digital nudge 3 *(returns information)* on online customer purchasing in South Africa
Sub- question 4: What is the effect of combination nudges *(all three combination nudge types)* on online customer purchasing in South Africa.

The results and the following analysis chapter show that the most effective of the single nudges was shipping information for the first research question. Shipping information nudges, although close to urgency nudge/timed promotions, showed the highest customer response to all dependent variable questions. The averages between the group variants were not statistically significant. However, based on Hummel and Maedche (2019), only 61% of nudging elements are, and this was to be expected.
For combination nudges, the results were very logical, following the single nudge results. The two highest customer response nudge variants, shipping information and urgency nudge/timed promo together as a combination nudge, resulted in the highest customer response. The nudge combination of shipping information and return information came second, while the combination nudge (timed promotion + shipping information + return information) had the least response of the three combination nudges, which is similar to a previous study by Schneider et al. (2020), who noted that digital nudging is

a double-edged sword, where combining too many digital nudges can have a negative backfiring effect on measured variables. This combination of nudge (timed promotion + shipping information + returns information) had the lowest customer response than having no nudge for all three measured variables. This further shows that the backfire effect reported by Osman et al. (2020) does not occur only when consumers' autonomy is crippled.

5.2. Theoretical Contributions

As shown by the theoretical background chapter, previous literature with the same approach and measuring these specific nudges in the context of South Africa was not found. This study supports the findings of Wiederhold and Martinez (2018) while also extending their proposed individual factors with a new factor impacting the purchase decision in the context of clothing and shoes, called 'material preference.'

The findings of this study support the notion that individual and psychological factors have a larger impact on purchasing decisions than nudges do (Sunstein, 2017). Specifically, the items' price, material composition, and look are more important to consumers in their purchase decisions than suggestions conveyed through digital nudges.

Schneider et al. (2020) found that nudging does not always lead to the desired outcome. This study and its results showed the same core principle: Nudging is a double-edged sword. Done correctly, it can improve customer response within digital environments, but when done badly, it can lead to a less positive customer response compared to a situation where nudging was not done. This was the case with one particular combination nudge in this study: Timed promotions + shipping information + returns information. This variant turned out to result in less positive customer response than no nudging at all. This was interesting also because the other nudges and some moderately combined nudges produced a higher customer response. This study has revealed a new and previously overlooked type of nudging failure, that is, 'backfiring in which the combination of nudges lead to a contrary effect.

Wang & Bae (2020) and Wu et al. (2021) studied the effect of free shipping and found it to be a strong driver of purchase intent; they note that it is based on the monetary value of the incentive. This study also used shipping information as a nudge, and it was information rather than a monetary offer, so the results are very different. In this study, the presence of shipping information was found to have a statistically significant difference compared with having no nudging.

Luo et al. (2019) studied digital nudging of ECT (e-commerce cart targeting), and they found the effect of scarcity to increase the probability of a purchase by 20%. In this thesis, a timed promo/urgency nudge was hypothesized to trigger the effect of scarcity. Although this study did not attempt to calculate the probability of purchase based on the timed promo nudge, it still found similar results, consistent with Luo et al. (2019) that scarcity leads to a more positive customer response.

Hummel and Maedche (2019) also found in their literature review of digital nudging studies that digital nudges had a median effect of 21%. If the no nudge results of this study are compared with the shipping information nudge, it can be seen that the average effect in response was 5.5% across the three dependent variable questions. This differs from the median, but considering the approach to nudge design in this study, this was not surprising.

5.3. Practical contributions business practice implications

The main contribution of this study was the choice of nudges. As the theoretical background chapter of this study previously presented, the primary motivation for the nudge choice was influenced by the context of South Africa, as trust is a concern amongst other things, so it was important to investigate nudges that could influence trust in purchasing, such as shipping and returns information. However, the nudges were also chosen mainly based on how widely these nudges are already in use on the Superbalist website, which was used as the study's landing page. Superbalist is one of the widely used clothing e-commerce stores in South Africa. The results of this study provide interesting insights to the information systems academic research, managerial implications for e-commerce user experience design specialists, e-commerce manager's and behavioral science practitioners.

5.4. Identifying effective nudges

First, it reveals possible effective digital nudges on e-commerce websites in South Africa, namely, shipping information nudges and timed promotions/urgency nudges. This study clearly indicates that including the right nudges on an e-commerce product page could lead to a positive customer response. The results show that when correct nudges are present, it positively impacts perceived quality, interest in purchasing the presented product, and interest in purchasing in an online setting. However, it also shows that nudges are not enough to completely influence the final purchase decision, factors like brand awareness and loyalty also play a role in the final purchase decision hence a low customer response on the variable (are you interested in buying this product if you saw it on an online store)

5.5. Negative Implications of digital nudging interventions. /Research your nudges and test them

This study revealed possible opposite effects when applying digital nudges to products, suggesting that designers of e-commerce environments should take a more cautious approach when implementing nudges in their systems. Excessive nudging or over-combining digital nudges leads to a more negative customer response. In this study, the combination of nudge (timed promotion + shipping information + returns information) had negative results across all measure variables. This shows a negative backfiring effect caused by stacking too many nudges in a combination nudge design that practitioners should be aware of.

5.6. Always include social norm nudges like reviews

For this research, the researcher deliberately excluded the review nudge as we experimented with other less-explored nudges in South African e-commerce. Reviews are widely used on e-commerce websites worldwide and in South Africa. This is mainly because of their effectiveness in positively influencing customers' purchase decisions. Previous studies suggest that 91% of users read reviews of a product on average, and 84% trust them as personal recommendations (Truitt, 2020). Interestingly, in previous studies, it was also found that not only is the best individual nudge to use, but nudge combinations in which reviews were included also performed better than other nudges and nudge combinations on average (Kesseli, 2021). In conclusion, it is good to have reviews on an online shop, at least when you have positive reviews, even when those reviews contain no text.

5.7. Always Include some sort of nudge on the product page

This study has shown that it is better to include some sort of nudge rather than no nudging. Although some nudges, such as returns information and other combination nudges, did not result in a positive customer response across variables, it was clear that adding nudges to a product page could increases the chances of customers choosing the intended outcome. As shown in this study, most of the single nudge and combination nudge variants provided a higher customer response than having no nudges.

5.8. Suggestions for future research

Other user experience elements were not addressed in this study, but future research should be aware of. Some of the interesting user experience elements that are based on this study may provide interesting insights. Although a digital setting has been used quite frequently, many studies did not adhere the definition of "digital nudging" by Weinmann et al. (2016) (e.g. Esposito et al., 2017; Huang et al., 2017). This raises issues of competing definitions as other researchers start to come up with their own ones (e.g. Meske and Potthoff, 2017). Our study can only be a first step and further research is needed on this matter. Future research should include other nudge-like studies and compare the results with the conclusions drawn from this work. Moreover, it would be beneficial to include a quality rating of the selected studies, similar to Lycett et al. (2017), to weigh them accordingly, and to prevent that lower quality studies distort the results of high-quality ones.

Finally, we call for more research on digital nudging, especially using hardware, such as eye-tracking technology, virtual reality, or neurophysiological measurements. Given that such technology plays an increasing role in decision-making and economics (Innocenti, 2017), it is imperative to study the effects of digital nudges in such cases. We also call upon other researchers to publish insignificant results in the area of nudging such that the publication bias can be determined.

5.9. Product page visibility on both desktop and mobile devices.

When designing product pages for research purposes, it's critical to ensure that every information on the e-commerce page is fully visible. In this study, the research did not have a budget for designing the e-commerce website wireframes, instead, the researcher resorted to webpage screenshots. The screenshots were redesigned accordingly, which left the overall product page design pixelated, making it difficult for respondents to see all of the information.

5.10. Product Reviews

Even though this study did not study review nudges, they are still one of the most effective nudges, and businesses are recommended to always include them on their e-commerce product pages.

5.11. Default Nudges

it is valuable to the research community to note that default nudges seem to be more effective than any other nudge category This can be explained by the status quo bias (Samuelson and Zeckhauser, 1988) and decision inertia (Alós-Ferrer et al., 2016; Jung and Dorner, 2018), that are particularly vulnerable to defaults. We are not aware of other studies that ranked nudges by their effectiveness. Hence, we cannot compare it with previous studies or integrate it in the current state of research. Along with the choice architecture tool, the category of nudge varies in the primary publications. While defaults and social references were used frequently (e.g. Demarque et al., 2015; Goswami and Urminsky, 2016), other measures are less common. We assume that defaults are easy to implement and allow for a more precise causality of treatment and outcome than multi-step nudges such as eliciting implementation intentions or precommitment strategies (e.g. Nickerson and Rogers, 2010).

5.12. Limitations of the Study

This study was exploratory in nature. There was no previous literature in the same context of e-commerce in South Africa, product pages, and multiple nudges in the same study. Another issue was that the design of the mockups in this study was based on the Superbalist website screenshots, which was redesigned to fit the needs of this study; however, this resulted in fewer visible pages. In that case, visibility could have affected the overall results of the study, and even though there were

visibility issues on the product page, most of the findings showed a clear direction on the effect of each nudge or combination nudge.

Customer response was measured against three variables and as each variable had been designated only one question, the variable was not optimally measured. The results could have been extensive, with additional variables and questions. According to the nudge theory, nudges require more elaborate testing and adjustment. To come up with effective nudges, testing should be done throughout a long process that adjusts nudges and tries different angles to see how they can be applied most effectively. This was also lacking in this study and should be considered in future research.

Although the numerical differences between nudge variants and dependent variables were low, they were still managerially significant. To some extent, this study has proven the importance of shipping information as a nudge and its positive effect on customer choices in South Africa. According to Statista,(2023) home delivery is the main driver of online purchasing in South Africa, and this has been indicated by the study.

Digital nudges do not entirely influence users' final purchase decisions, and other non-cognitive factors, such as the product's price, look and feel, brand awareness, loyalty, and others, influence the final decision to purchase.

Most importantly, we derive insights for the effectiveness of nudges. Therefore, this study makes several contributions to the theory and practice of behavioural and experimental economics. Besides creating a theoretical framework for empirical nudging studies by means of a morphological box, the author assess the overall effectiveness of digital nudging and claim that it might be effective than proclaimed. In sum, nudges seem to work but the effect sizes are influenced by the application context and especially by the nudge category.

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6. Appendices

6.1. Appendix A: Ethics Approval

Faculty of Commerce
Private Bag X3, Rondebosch, 7701
2.26 Leslie Commerce Building, Upper Campus
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16 09 2022

Tapiwa Chihota

Department of Information Systems

University of Cape Town

REF: REC 2022/09/007

The Effect of Digital Nudging on the Users of eCommerce Websites in South Africa

We are pleased to inform you that your ethics application has been approved. Unless otherwise specified this ethical clearance is valid until 31-Dec-2023 .

Your clearance may be renewed upon application.

Please be aware that you need to notify the Ethics Committee immediately should any aspect of your study regarding the engagement with participants as approved in this application, change. This may include aspects such as changes to the research design, questionnaires, or choice of participants.

The ongoing ethical conduct throughout the duration of the study remains the responsibility of the principal investigator.

We wish you well for your research.

2022.10.13
14:08:30 +02'00'

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6.2. Appendix B: DSA 100 – Student Access Approval

	RESEARCH ACCESS TO STUDENTS	DSA 100

NOTES

1. This form must be **FULLY** completed by all applicants who want to access UCT students for the purpose of research or surveys.
2. Return the fully completed **(a) DSA 100** application form **by email**, in **the same word format**, together with **your: (b) research proposal inclusive of your survey, (c) copy of your ethics approval letter / proof (d) informed consent letter** to: Nadierah.Pienaar@uct.ac.za. You application will be attended to by the Executive Director, Department of Student Affairs (DSA), UCT.
3. The turnaround time for a reply is **approximately 10 working days**.
4. NB: It is the responsibility of the researcher/s to apply for and to obtain **ethics approval and to comply with amendments that may be requested;** as well as **to obtain** approval to access UCT staff and/or UCT students, from the following, at UCT, respectively:
   (a) **Ethics**: Chairperson, Faculty Research Ethics Committee' (FREC) for ethics approval, (b) **Staff access:** Executive Director: HR for approval to access UCT staff, and (c) **Student access:** Executive Director: Student Affairs for approval to access UCT students.
5. **Note:** UCT Senate Research Protocols requires compliance to the above, **even if prior approval has been obtained from any other institution/agency. UCT's research protocol requirements applies to *all* persons, institutions and agencies from UCT and external to UCT who want to conduct research on human subjects for academic, marketing or service related reasons at UCT.**
6. **Should approval be granted to access UCT students for this research study, such approval is effective for a period of one year from the date of approval (as stated in Section D of this form), and the approval expires automatically on the last day.**
7. **The approving authority reserves the right to revoke an approval based on reasonable grounds and/or new information.**

SECTION A: RESEARCH APPLICANT/S DETAILS

Position	Staff / Student No	Title and Name	Contact Details (Email / Cell / land line)
A.1 Student Number	TAPTPW001	Mr Tapiwa Chihota	Tpwtap001@myuct.ac.za / 0732133152
A.2 Academic / PASS Staff No.			
A.3 Visitor/ Researcher ID No.			
A.4 University at which a student or employee	UCT	Address if *not* UCT:	
A.5 Faculty/ Department/School	Faculty of Commerce / Department of Information Systems		
A.6 APPLICANTS DETAILS If different from above	Title and Name	Tel.	Email

SECTION B: RESEARCHER/S SUPERVISOR/S DETAILS

Position	Title and Name	Tel.	Email
B.1 Supervisor	Assoc Prof Adheesh Budree	0844454455	Adheesh.budree@uct.ac.za
B.2 Co-Supervisor/s			

SECTION C: APPLICANT'S RESEARCH STUDY FIELD AND APPROVAL STATUS

C.1 Degree – if applicable	Master of Commerce in Information Systems
C.2 Research Project Title	The effect of digital nudging on the users of ecommerce websites in South Africa
C.3 Research Proposal	Attached: Yes [■] No [ ]
C.4 Target population	UCT student eCommerce Consumers
C.5 Lead Researcher details	If different from applicant:
C6. Will use research assistant/s	Yes [ ] No [■] If yes- provide a list of names, contact details :
C.7 Research Methodology and Informed consent	**Research methodology:** Quantitative via online questionnaire **Informed consent:** Advised to Participants
C.8 Ethics clearance status from UCT's Faculty Ethics in Research Committee /Chair (EiRC)	Approved by the UCT EiRC: Yes [■] With amendments: Yes [ ] No [■] (a) Attach copy of your UCT ethics approval. Attached: Yes [■] No [ ] (b) State date / Ref. No / Faculty of your UCT ethics approval: 16/09/2022 Ref/Faculty: : REC 2022/09/007

SECTION D: APPLICANT/S APPROVAL STATUS FOR ACCESS TO STUDENTS FOR RESEARCH PURPOSE
(To be completed by the ED, DSA or NOMINEE)

	Approved / With Terms / Not	* Conditional approval with terms	Applicant/s Ref. No.:	
D.1 APPROVAL STATUS	(i) Approved [■] ~~(ii) With terms~~ ~~(iii) Not approved~~	a) Access to students for this research study must only be undertaken after written ethics approval has been obtained. *b)* In event any ethics conditions are attached, these must be complied with before access to students.	TAPTPW001 / Mr Tapiwa Chihota	
D.2 PREPARED BY:	Designation	Name	Signature	Date of Approval
	Administrative Assistant	*Tavonga Mazhetese*		11/10/2022
D.3 APPROVED BY:	Designation	Name	Signature	Date of Approval
	Executive Director / Nominee Department of Student Affairs	*Mr Pura Mgolombane*		11/10/2022

6.3. Appendix C: Cover Letter and letter of consent

Research Participation Letter

Dear Sir/Madam

I am a Master's student in the Department Information Systems, researching the effect of digital nudging on the users of eCommerce websites in South Africa. This research has been approved by both the Commerce Ethics in Research Committee and the Director of Student Affairs. All UCT students, aged 18 to 55, are invited to participate in this study by completing two sets of two tasks.

By partaking in this research, you stand the chance of winning **1** of **8** Takealot gift vouchers, worth **R250** each. By referring friends and colleagues, participants will be re-entered into the draw as many times as they have been referred. Winners will be drawn randomly and shall be contacted within 5 days of the completion of this study. Only participants who complete ***questionnaire*** will be eligible.

Procedure:

An online-based questionnaire is to be completed by participants assessing effect of digital nudges on an eCommerce platform . Each Session will take approximately 15 minutes to complete in total.

If you are interested in participating in this study, please use the following link: ..

NOTE: Please be assured that your responses are anonymous and will be kept fully confidential, your participation in this research is voluntary and that you have the right to withdraw at any point during the study, for any reason, and without any prejudice.

Your participation in this study would be greatly appreciated.

If you have any queries regarding the study, please contact me at TPWTAP001@myuct.ac.za

Kind regards,
Tapiwa Chihota – Researcher
Department of Information Sytems, UCT

C

The effect of digital nudging on the users of eCommerce Websites in South Africa

A Participant Consent

Department of Information Systems
University of Cape Town

The effect of digital nudging on the users of eCommerce Websites in South Africa

Consent to take part in research

- I..... voluntarily agree to participate in this research study.
- I understand that even if I agree to participate now, I can withdraw at any time or refuse to answer any question without any consequences of any kind.
- I understand that I can withdraw permission to use data from my questionnaire within two weeks afterthe questionnaire, in which case the material will be deleted.
- I have had the purpose and nature of the study explained to me in writing and I have had the opportunity to ask questions about the study.
- I understand that participation involves [*responding to questions that require the participant to provide information as asked in the questionnaire]*
- I understand that I will not benefit directly from participating in this research.
- I understand that all information I provide for this study will be treated confidentially.
- I understand that in any report on the results of this research my identity will remain anonymous. This will be done by changing my name and disguising any details of my questionnaire which may reveal my identity or the identity of people I speak about.
- I understand that disguised extracts from my questionnaire may be quoted in [*research dissertation and conference presentation*].

- I understand that if I inform the researcher that myself or someone else is at risk of harm, they may have to report this to the relevant authorities - they will discuss this with me first but may be required to report with or without my permission.

- I understand that signed consent forms and original audio recordings will be retained in [*specify location, security arrangements and who has access to data*] until [*specific relevant period – for students this will be until the exam board confirms the results of their dissertation*].

- I understand that a transcript of my questionnaire in which all identifying information has been removed will be retained for [*specific relevant period – for students this will be two years from the date of the exam board*].

- I understand that under freedom of information legalization I am entitled to access the information I have provided at any time while it is in storage as specified above.

- I understand that I am free to contact any of the people involved in the research to seek further clarification and information.

For further comments or complaints, please contact the researcher, Tapiwa Chihota
@TPWTAP001@myuct.ac.za

6.4. Appendix D: Research Instrument

Digital Nudging Questionnaire

Research Question

What effect does digital nudging have on the customer of e-commerce websites in South Africa?

Sub Questions

1. Which e-commerce digital nudge is most effective in producing a positive customer response?
2. Can a nudge improve the performance of an e-commerce website?

Question	Variable
Q1.What is your age ?	I) 18-30 ii)23-30 iii)31-40 iv)41-50 v)51-60 vi)Over60 vii) Do not want to disclose
Q2. What is your highest level of education	i) High School ii) Bachelor degree or similar iii) Master degree or similar iv) PhD v) Do not want to disclose

Q3. What is your sex	i) Male ii) Female iii)Other iv) I do not wish to disclose

Q3. What is your sex	i) Male ii) Female iii)Other iv) I do not wish to disclose
Q4. What is your annual income	i Below R100 000 ii) R100 000 – R200 000 iii) R200 000 – R400 000 iv) R500 000 – R750 000 v) R1000 000 and above
Please examine the following image of the product page from an online shop and evaluate the product	1. No Nudge : 2. Nudge – Urgency (Timed promos) 3. Nudge – Shipping info 4. Nudge – Returns 5. Nudges – Urgency Promo + Shipping info 6. Nudges – Shopping Info + Returns 7. Nudges –Urgency Promo + Shipping info+

D

See figures 1-7 to examine the images	Returns
Q5. Would you be interested in finding out more about the product you saw?	i. Not at all interested ii. Not much interested iii. Somewhat interested iv. Very Interested
Q6. I would consider buying a new pair of sneakers.	i) Strongly disagree ii) Disagree iii) Somewhat disagree iv) Neutral v) Somewhat agree vi) Agree vii) Strongly agree viii) Strongly Agree
Q7. I believe this product is of high quality?	i) Strongly disagree ii) Disagree iii) Somewhat disagree iv) Neutral v) Somewhat agree vi) Agree vii) Strongly agree
Q8. Are you interested in buying this product if you saw it in an online store?	i) Not at all interested ii) Not much interested iii) Somewhat interested iv) Very interested
Q9. Do you own a pair of sneakers	i) Yes ii) No
Q10. How often do you wear sneakers	i) Never ii) Rarely

	iii) Sometimes iv) Often v) Always
Q11. What are the attributes to you when buying a shoe/sneaker from an online store	i) Quality ii) Promotions iii) Price iv) Shipping information v) Returns Policy Scale for each attribute i) Not at all important ii) Low importance iii) Neutral iv) Important v) Very important

Fig 1: No Nudge

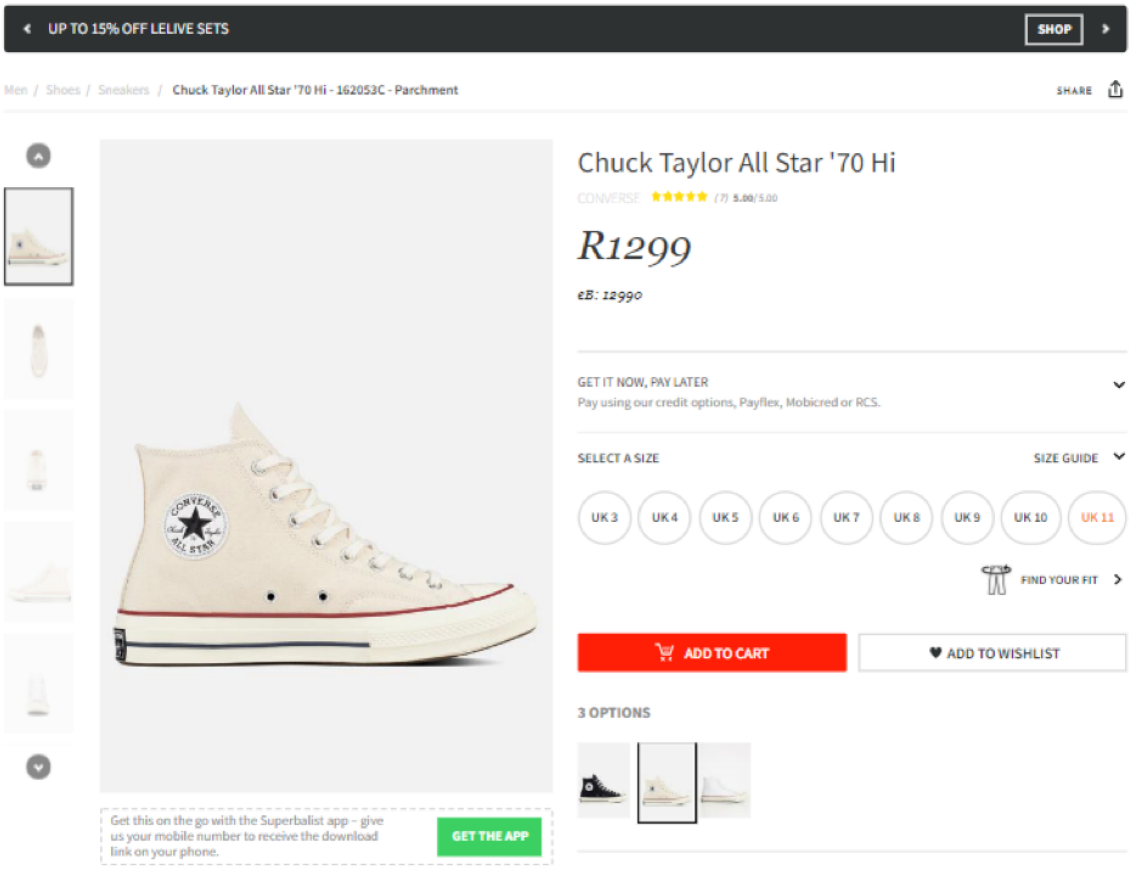

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Fig 2 Urgency Nudge (Timed Promo)

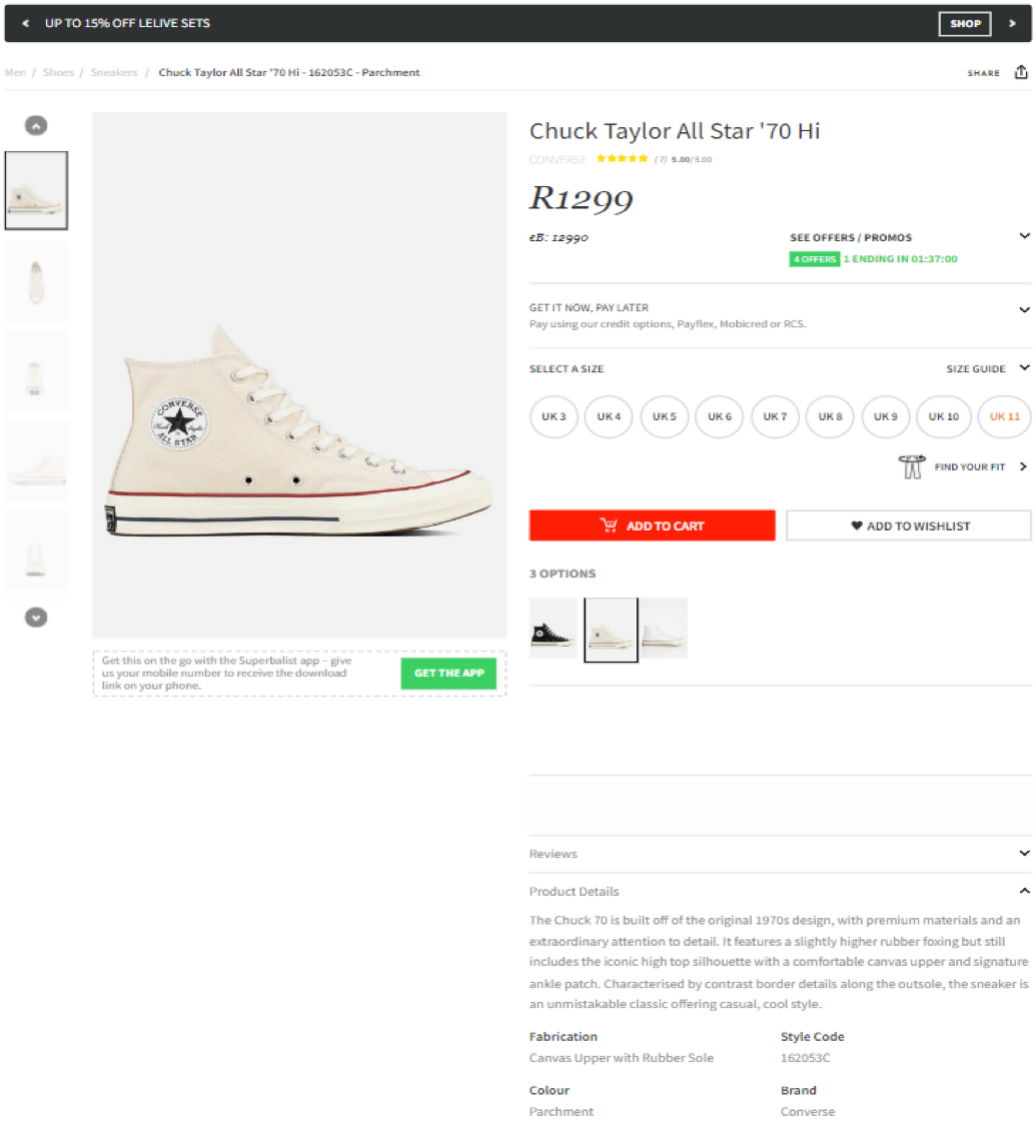

Fig 3. Shipping Information

UP TO 15% OFF LELIVE SETS SHOP

Men / Shoes / Sneakers / Chuck Taylor All Star '70 Hi - 162053C - Parchment SHARE

Get this on the go with the Superbalist app - give us your mobile number to receive the download link on your phone. GET THE APP

Chuck Taylor All Star '70 Hi

CONVERSE ★★★★★ (0) 5.00/5.00

R1299

~~EB: 12990~~

GET IT NOW, PAY LATER
Pay using our credit options, Payflex, Mobicred or RCS.

SELECT A SIZE SIZE GUIDE

UK 3 | UK 4 | UK 5 | UK 6 | UK 7 | UK 8 | UK 9 | UK 10 | UK 11

FIND YOUR FIT

ADD TO CART ADD TO WISHLIST

3 OPTIONS

Shipping When will I get it?

FREE Standard delivery. Faster options available.

FREE Collection. Open 7 days a week.

Reviews

Product Details

The Chuck 70 is built off of the original 1970s design, with premium materials and an extraordinary attention to detail. It features a slightly higher rubber foxing but still includes the iconic high top silhouette with a comfortable canvas upper and signature ankle patch. Characterised by contrast border details along the outsole, the sneaker is an unmistakable classic offering casual, cool style.

Fabrication
Canvas Upper with Rubber Sole

Style Code
162053C

Colour
Parchment

Brand
Converse

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Fig 4 Returns Information

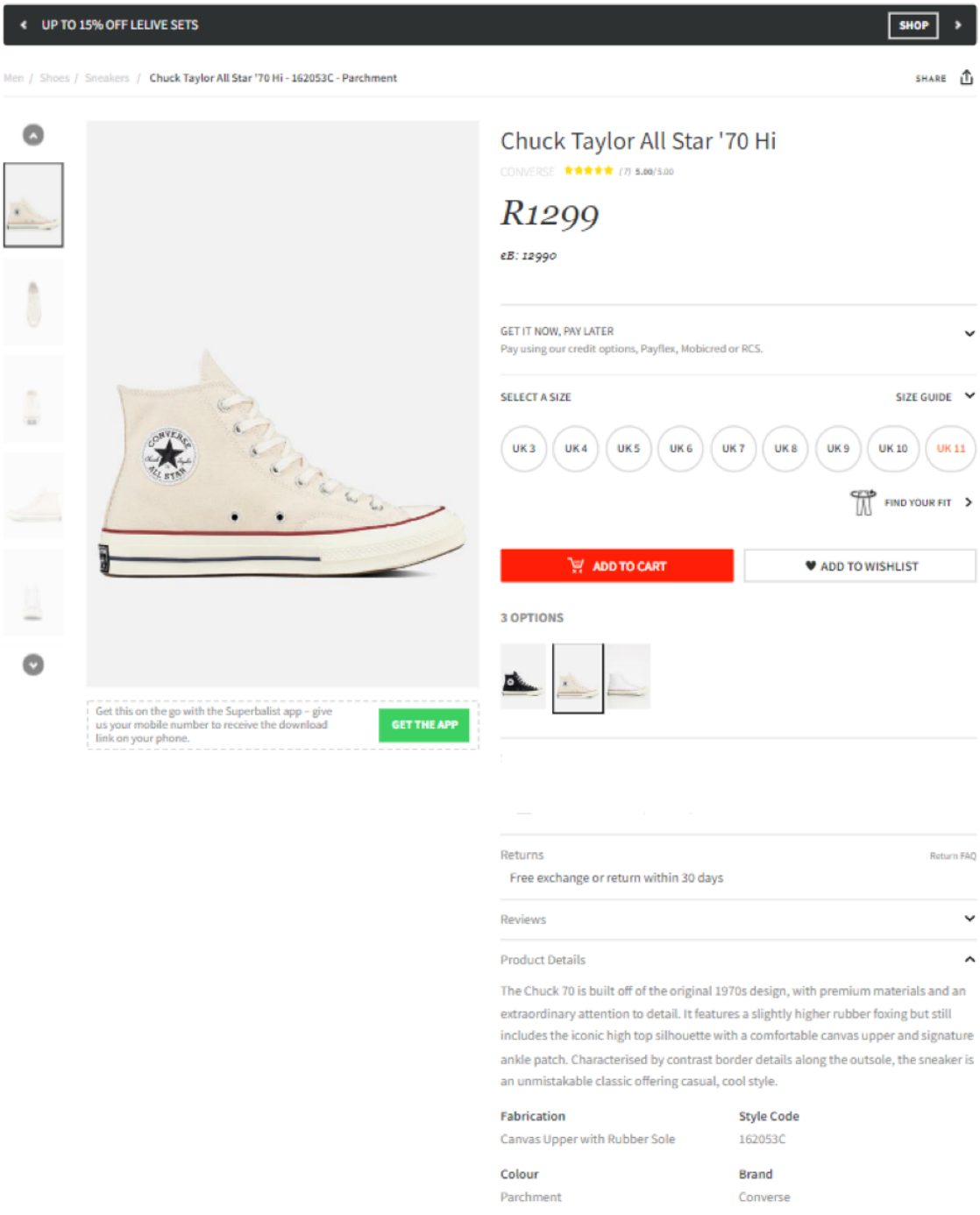

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Fig 5: Combination Nudge (Urgency Promo+ Shipping/Delivery Info+ Returns)

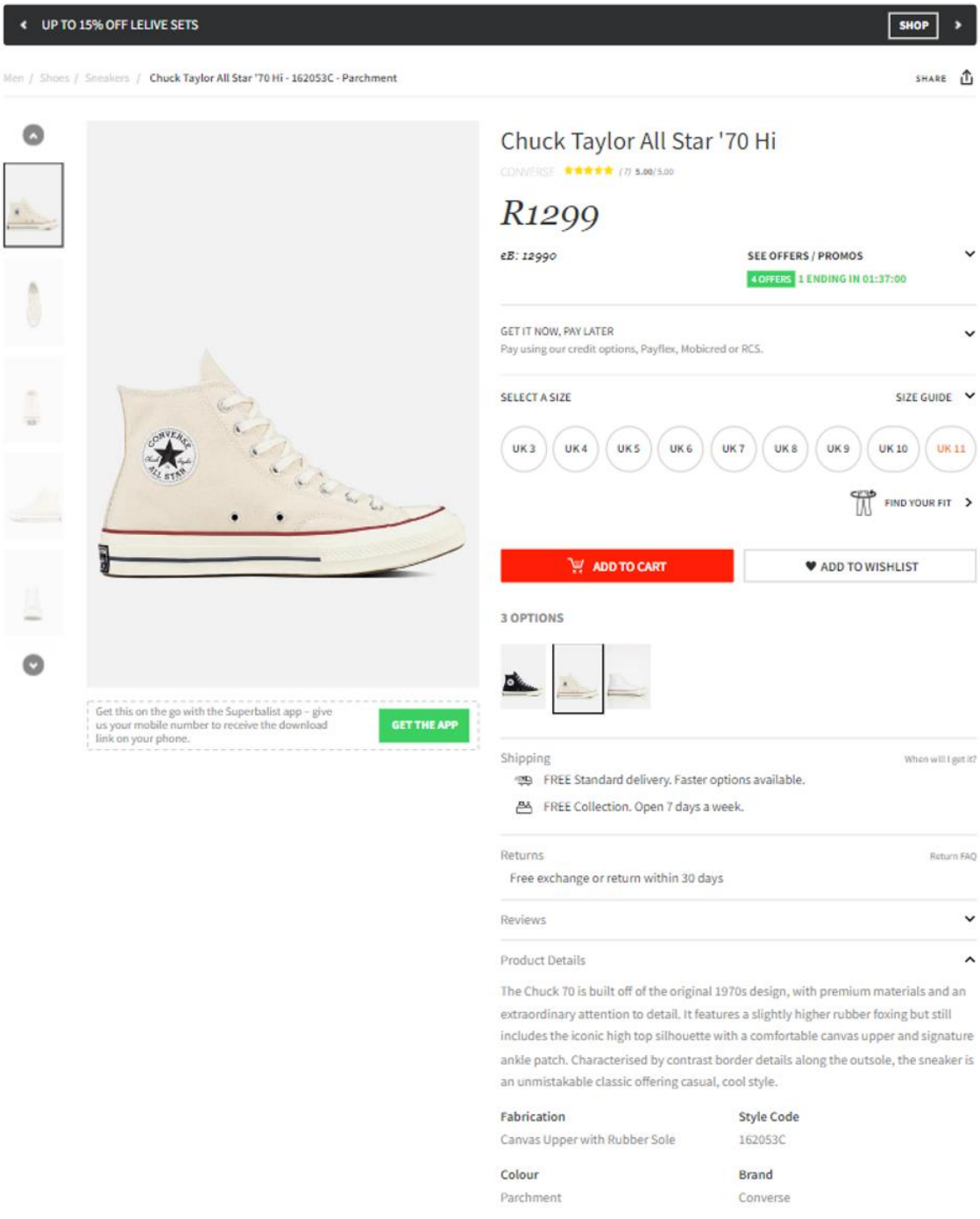

Fig 6 Combination Nudge (Shipping Info + Returns).

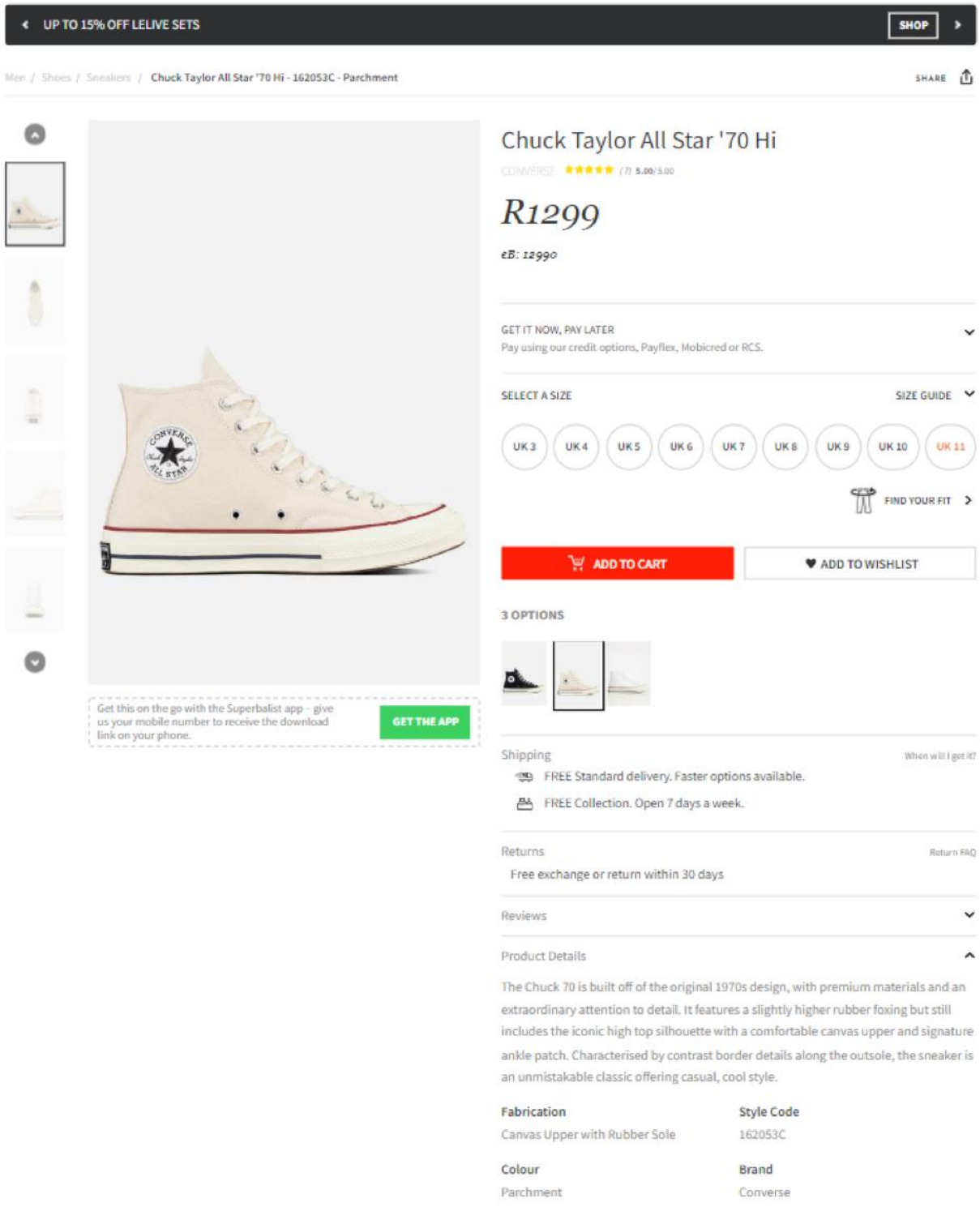

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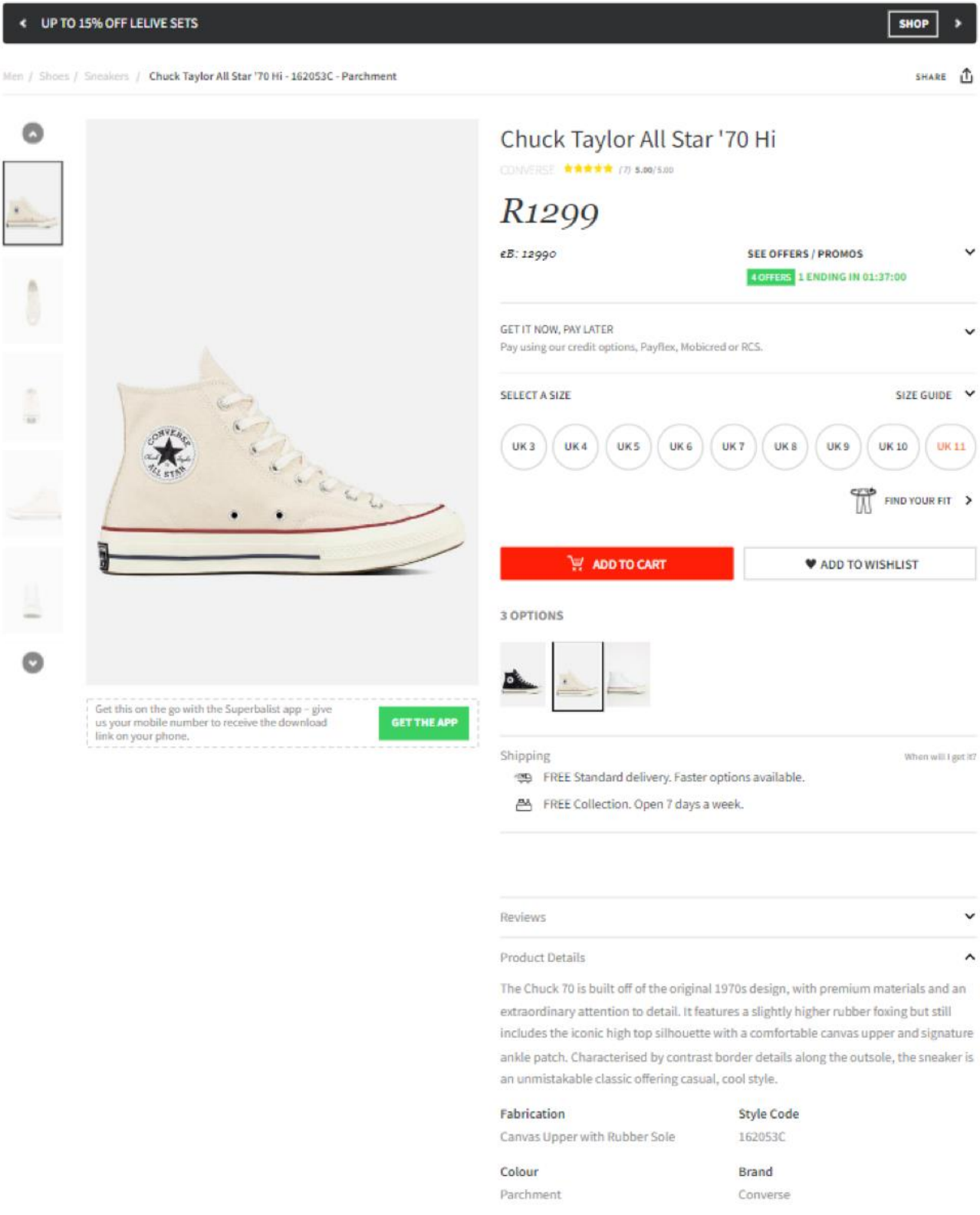
Fig 7 Combination Nudge (Urgency Promo + Shipping Info)



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Summary of descriptive Statistics

Breakdown Table of Descriptive Statistics (Sheet1 in The effect of digital nudging on the users of eCommerce Websites in South Africa (1-222)		
Nudge_Types	I believe this product is of high quality? Means	I believe this product is of high quality? N
1	2,586364	220
2	2,714953	214
3	2,810680	206
4	2,676329	207
5	2,679612	206
6	2,716346	208
7	2,788462	208
All Grps	2,709326	1469

Breakdown Table of Descriptive Statistics (Sheet1 in The effect of digital nudging on the users of eCommerce Websites in South Africa (1-222) (1)finalNB analyse -)		
I believe this product is of high quality? Std.Dev.	I would consider buying a new pair of sneakers. Means	I would consider buying a new pair of sneakers. N
1,230063	2,954751	221
1,284820	3,037383	214
1,353616	3,112195	205
1,217418	3,000000	205
1,231407	3,029126	206
1,274545	3,062500	208
1,373828	3,134615	208
1,280987	3,046353	1467

Breakdown Table of Descriptive Statistics (Sheet1 in The effect of digital nudging on the users of eCommerce Websites in South Africa (1-222) (1)finalNB analyse -)		
I would consider buying a new pair of sneakers. Std.Dev.	Are you interested in buying this product if you saw it in an online store? Means	Are you interested in buying this product if you saw it in an online store? N
1,659063	2,592760	221
1,549952	2,516279	215
1,657454	2,524510	204
1,629989	2,439614	207
1,619734	2,509709	206
1,642120	2,488038	209
1,677113	2,524038	208
1,631638	2,514286	1470

Breakdown Table of Descriptive Statistics (Sheet1 in The effect of
Are you interested in buying this product if you saw it in an online store? Std.Dev.
0,937473
0,941497
0,954320
0,926930
0,930462
0,909935
0,921771
0,930974

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