



# Nudge, click, buy: Nudging in e-commerce

Inês Fernandes

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## **Abstract**

Today, consumers face an enormous pool of options to choose from in their day-to-day purchases. With the boom of online channels, e-commerce platforms present a choice environment where decision-making can be especially overwhelming and time-consuming. To remain competitive firms must adapt their choice architecture to this environment. One of the most relevant aspects of choice architecture is how products are presented which directly impacts purchase decisions. This impact can be amplified with the application of nudges in product display. These tools are beneficial in two ways, they nudge consumers towards better-suited options and protect freedom of choice. To understand nudges' impact on the purchase intention this paper uses an online questionnaire to analyse how consumers react to the changes in choice architecture. This is accomplished with the development of two experiments, one related to the economic default nudge and another to the social norm nudge. Findings suggest that the application of a social norm nudge is an effective method to change consumers' behaviour in e-commerce purchases. In contrast, insignificant results were obtained regarding the default nudge impact on online purchases of technology accessories. Furthermore, the analysis of the direct impact of nudges on purchase intention revealed that there isn't a significant impact on it, but nudges do affect it through changes in purchase satisfaction. Lastly, this study bears relevant theoretical and practical implications in the study of nudge effects on online choice architecture. The paper fills a gap in the literature on the influence of product display on consumer behaviour.

Keywords: E-commerce, online retailer, choice architecture, nudging, default nudge, social-norm nudge.

Title: Nudge, Click, Buy: Nudging in e-commerce

Author: Inês Fernandes

## **Sumário**

Atualmente, os consumidores enfrentam um enorme conjunto de opções por onde escolher. Com a expansão dos canais online, as plataformas de comércio eletrônico apresentam um ambiente em que tomar decisões pode ser difícil e moroso. Para se manterem competitivas, as empresas devem adaptar a sua arquitetura de escolha a este ambiente. Um dos aspectos mais relevantes da arquitetura da escolha é a forma como os produtos são apresentados, impactando diretamente as decisões. Este impacto é amplificado com a aplicação de "nudges". Estes são benéficos já que "empurram" os consumidores para opções mais adequadas e protegem a liberdade de escolha. Para compreender o seu impacto na intenção de compra, este artigo utiliza um questionário para analisar a forma como os consumidores reagem às alterações na arquitetura da escolha. Para tal, são desenvolvidas duas experiências, relacionadas com os nudges de default e de norma social. Os resultados sugerem que a aplicação do nudge de norma social é um método eficaz para alterar o comportamento dos consumidores nas compras online. Porém, foram obtidos resultados insignificantes relativamente ao impacto do default nudge. Além disso, a análise do impacto dos nudges na intenção de compra revelou que não existe um impacto significativo nesta intenção, mas os nudges afectam-na através de alterações na satisfação de compra. Por último, este estudo tem implicações teóricas e práticas relevantes no estudo dos efeitos do nudge na arquitetura da escolha online. O artigo preenche uma lacuna na literatura sobre a influência da apresentação do produto no comportamento do consumidor.

Palavras-chave: Comércio eletrônico, retalhista online, arquitetura da escolha, nudging, nudge por defeito, nudge por norma social.

Título: Nudge, clicar, comprar: Nudging no comércio eletrônico.

Autora: Inês Fernandes

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## Introduction

In a world where consumers want to make better and faster decisions, many challenges are faced both by buyers and sellers. On one side customers have to deal with the astronomical increase of options in their day-to-day choices while having to invest more of their time to make them. This problem can be exponentiated if we consider e-commerce platforms where decision-making can be especially overwhelming and time-consuming ([Johnson et al., 2012](#)). On the other, firms try to remain competitive by offering their customers personalized options that decrease the research effort and increase overall purchase happiness which can be costly or fruitless if the adequate consumer journey is not applied ([Schmutz et al., 2010](#)). Thus, it is pertinent to understand if firms can adjust their choice architectures so that decision-making is facilitated while improving customer journey.

Moreover, even the choice of a utilitarian product is transformed in a long process where many variables are considered, and countless choices are presented. Hence, not only are consumers more prone to make poorer choices ([Murray & Häubl, 2008](#)) but could even not reach a decision at all, which is the worst possible scenario for both the consumer and the firm. Accordingly, [Sobolev \(2021\)](#) studied the impact of the implementation of nudges in a digital context, shedding some light on how businesses can improve decision-making by using nudge techniques. Likewise, this paper will recreate partially the presented structure by studying the application of nudges in a new context and knowledge area, i.e., nudges will be applied in an e-commerce context, recreating the choice architecture presented to consumers, while targeting to impact marketing objectives and results. Ultimately the research goal is to change decision-making, so it becomes more customer-friendly and simultaneously profit-enhancing for firms. Thus, this paper focuses on understanding how marketers can change consumers' choice architecture through nudges, so their decisions become more time-efficient while improving purchase satisfaction and increasing purchasing intentions.

Therefore, how can choice architecture be adapted so that consumer autonomy is unchanged but leads to better-suited and preferences-matching choices? Choice architecture, as coined by [Thaler and Sustein \(2008\)](#), is the choice presentation possibilities provided to decision-makers. It significantly impacts decisions to the extent that often what is chosen is dependent on how the choice is presented ([Johnson et al., 2012](#)). Choice architects can influence decisions in many ways, namely by altering attribute order, varying the presentation order, and selecting defaults ([Johnson et al., 2012](#)). With the boom of the online channel, this impact is exacerbated since architects can easily track and nudge behaviour at the point of purchase using

choice architecture tools such as Ordering and Partitioning. ([Sobolev, 2021](#); [Dellaert et al., 2022](#)). Hence, optimizing choice architecture in this channel could vastly impact bottom-line results for retailers. In fact, one of the most relevant aspects of choice architecture is how products are presented to potential buyers. Specifically, product presentation directly impacts purchase decisions through ordering and partitioning ([Cai & Xu, 2008](#); [Dellaert et al., 2022](#)). This impact can be amplified with the application of nudges in product display while maintaining freedom of choice ([Johnson et al., 2012](#)). These tools are beneficial for consumers in two ways: first, they nudge them towards more desired allocation in consumption, second, they make choices more efficient since they present better-suited options.

To understand nudges' impact on the relevant variables of purchase satisfaction and efficiency this paper uses an online questionnaire to analyse how the pool of participants reacts to the changes in choice architecture. This is accomplished with the development of two experiments, one related to the economic default nudge, which is defined in the study as a default order change instead of the typical default choice, and another using the economic social norm nudge. Both experiments are deployed to understand the impact of the nudges on variables related to purchase satisfaction, namely conversion to the product's page, option presence in the consideration set, decision speed, and purchase satisfaction.

The present paper fills research gaps in the study of nudge effects on online choice architecture, as well as other underlying concepts. First, it explores how a website's product display can influence consumers' behaviour, and in turn firms' sales ([Cai & Xu, 2008](#)). In line, the cognitive process that supports online purchase decisions is also analysed ([Sanak-Kosmowska, 2021](#)). Secondly, this research contributes to the expansion of the limited information regarding the quantification of nudge effects. The reason behind nudge application has been thoroughly investigated ([Caraban et al., 2019](#)), but little research has been done on how to apply nudges, e.g. which mechanisms can nudges employed to create behaviour change ([Caraban et al., 2019](#)). Lastly, in the paper default nudge is studied as a change in the default order rather than being a change in the default option, which is the outcome of not making a choice, the common definition used in literature ([Goswami & Urminsky, 2016](#)).

To conclude, in this paper a review of the literature concerning decision-making, the nudging tool, and ethical concerns regarding impact on choice architecture is presented, followed by a description of the employed research method and its results. In the final part, the

results are analysed in light of previous literature and suggestions for future research are presented as well as overall conclusions.

## **Literature Review**

The design of e-commerce platforms significantly impacts consumer preferences, not just through its content but also through presentation formats of information. To better understand how the e-commerce context influences choice it is important to first understand how platforms are designed. The platforms include sorting features, which allow users to sort products based on price or other criteria such as customer ratings ([Cai & Xu, 2008](#)). The presentation structure utilised on category pages, often a list or matrix format, is a critical component in this design. Matrix presentation modes, in which products are displayed sequentially, similar to reading a book, highlight how users browse through options in this choice environment ([Schmutz et al., 2010](#)). This format adds obstacles, forcing users to search and filter information while keeping crucial features from earlier items in working memory ([Schmutz et al., 2010](#)).

Finding the right balance in option presentation is critical, as more options increase the likelihood of aligning with consumer preferences while simultaneously increasing cognitive weight, demanding further review efforts ([Johnson et al., 2012](#)). Strategically presenting a small number of options becomes critical, encouraging rational trade-off calculations without overwhelming the decision-maker ([Johnson et al., 2012](#)). Thus, the careful selection of the presenting format is critical in designing the decision-making process and subsequent consumer preferences.

## **Purchasing in e-commerce**

E-commerce platforms are dynamic environments through which consumers can access a diverse range of items and services. Understanding how customers engage with these websites sheds light on how they make decisions, but it is important to note that individual differences among customers contribute to the market's diverse representation of choice architectures ([Johnson et al., 2012](#)). When presented with options in the online context, consumers tend to rely on the information supplied to them at that moment rather than retrieving previous evaluations ([Simonson, 1999](#)). They suffer processing capacity restrictions and are frequently hesitant to switch across interfaces to obtain information ([Murray & Häubl, 2008](#)). Consumers focus their attention on a specific set of options which is critical in shaping decisions, as customers judge their attractiveness before selecting ([Simonson, 1999](#)).

How information is displayed matters since exhaustive searching in a sorted product list may harm decision quality ([Xu & Kim, 2008](#)). Consumers who wish to save time and effort prefer being able to choose from a narrow range of products. In line, when choosing from a limited selection of options visitors' choice satisfaction increases ([Johnson et al., 2012](#)). Furthermore, the arranged order of sellers inside a list significantly impacts consumer attention, with earlier entries gaining greater consideration due to cognitive capacity distribution and decreased willingness to process information ([Xu & Kim, 2008](#)). Finally, as visitors navigate these options, heuristics, or mental shortcuts, come into play. The opportunity to apply nudges within choice architecture occurs as people seek to reduce the cognitive burden ([Murray & Häubl, 2008](#)).

Faced with these websites' design consumers build their preferences. This is a dynamic process impacted by the interaction of evaluated options and how they are assessed within a specific choice set ([Simonson, 1999](#)). This procedure is intimately linked to the design of product listings on e-commerce websites, and it significantly impacts decision-making and subsequent sales outcomes ([Schmutz et al., 2010](#)). The number of options available is a critical component in determining context-specific preferences ([Johnson et al., 2012](#)). Starting with a small set of options and giving customers the choice to explore more if wanted, acknowledges the subtle construction of preferences, enabling flexibility in the decision-making process ([Johnson et al., 2012](#)). Thus, the precise design of the product listing itself appears as a crucial aspect, influencing the cognitive processes of website visitors ([Schmutz et al., 2010](#)).

When consumers navigate e-commerce websites, social considerations significantly affect their decision-making process. According to [Talib & Saat \(2017\)](#), there is a significant connection between ratings, reviews, and the building of trust in online purchasing experiences. This perceived trust correlates with perceived utility, usage, and buying intention, influencing their decision-making process ([Talib & Saat, 2017](#)). Furthermore, a sizable proportion of buyers regard reviews as critical assistance in product selection and purchasing decisions ([Subathra et al., 2023](#)). Social proof, a psychological phenomenon, in which people watch and replicate the acts of others as proper behaviour ([Talib & Saat, 2017](#)), has a significant influence on consumer decisions in online retail environments. Marketers can leverage this by using social recommendations as a type of social proof, thereby boosting purchases ([Subathra et al., 2023](#)).

The requirement for legitimacy verification in purchase decisions emphasises the impact of social cues on consumer behaviour ([Talib & Saat, 2017](#)). In line, preference building extends beyond product attributes, requiring the creation of the offer's subset as well as careful consideration of how options are presented. This influence is amplified by social dynamics, with consumer decisions heavily influenced by the groups or categories into which alternatives are partitioned ([Dellaert et al., 2022](#)). In sum, understanding the interaction between product presentation, customer cognition, and social context is critical for understanding consumer preference formation.

### Ordering and Partitioning

In the world of e-commerce, two essential choice architecture tools, ordering and partitioning, play critical roles in influencing consumer decision-making processes ([Dellaert et al., 2022](#)). These tools, which are deployed on numerous online platforms, make a substantial contribution to organising available options and moulding user choices.

Ordering is defined as the systematic organisation of available options depending on criteria such as price ([Dellaert et al., 2022](#)). This purposeful organisation is the foundation of good choice architecture. Partitioning, on the other hand, entails the strategic division of a decision set into two or more subgroups, allowing for an independent investigation ([Johnson et al., 2012](#)). This prevalent tool used in online purchasing contains a primary set with a limited number of alternatives and a secondary set with all remaining options, which is frequently shown across numerous web pages ([Dellaert et al., 2022](#)). It is critical to highlight that partitioning does not eliminate possibilities; rather, it subtly modifies decisions while maintaining consumer control. The combination of ordering and partitioning has a synergistic impact. Although no single technique may guarantee better choice outcomes, their use together redirects consumer attention to selected options ([Dellaert et al., 2022](#)). This combined application can improve choice by diverting customers' attention towards products that are more aligned with their preferences. The main beneficial aspect is that focusing attention on certain options can optimize customers' decision-making processes if it properly grabs and maintains their attention ([Dellaert et al., 2022](#)).

As defined above, e-commerce ordering requires the systematic arranging of accessible options based on specific criteria ([Dellaert et al., 2022](#)). An underlying mechanism of ordering is the "Order Effect", or the position of a product in a list, which plays a role in consumer

responses to options in different serial places ([Cai & Xu, 2008](#)). Despite the acknowledged significance of serial positions in the listing, there has been little research into how these positions specifically influence consumer choice in the electronic market ([Xu & Kim, 2008](#)). Consumers are more likely to select options provided first, resulting in a primacy effect that favours products at the top of an ordered list ([Johnson et al., 2012](#)). This phenomenon emphasises the importance of initial choices in shaping customer preferences. Hence, the technique used to determine option ordering is an important part of choice architecture. A poorly constructed order can result in poorer choices being placed earlier in the serial order, influencing consumer decisions ([Dellaert et al., 2022](#)). Consumers' increased focus on initial alternatives can be beneficial if the order corresponds well with their preferences, but it poses a potential hazard if the order does not. Partitioning can be used as a supplemental method to reduce excessive searching inside the ordered set and potential information overload ([Dellaert et al., 2022](#)).

Partitioning focuses buyers' attention on a part of the whole product selection, limiting their choice to the presented set ([Dellaert et al., 2022](#)). Thus, the set's configuration becomes a critical determinant of purchase decisions. Partitioning, crucially, does not eliminate possibilities. Rather, it slightly modifies choice while preserving consumer autonomy. This tool has a unique impact on stirring people towards desired behaviours. Consumers with weaker intrinsic preferences are more strongly impacted by the intervention, while consumers with high intrinsic preferences are less impacted ([Johnson et al., 2012](#)). Furthermore, when only the most significant characteristics are highlighted, cognitive effort is reduced ([Johnson et al., 2012](#)). Correspondingly reviewing the initial set of alternatives needs less effort from the consumer than reviewing the whole list ([Simonson, 1999](#)). As a result, the extra effort required to view the next page may surpass the potential returns from the selections on that page ([Dellaert et al., 2022](#)). Partitioning's efficacy is dependent on the precise configuration of subsets, particularly when it comes to product information ([Simonson, 1999](#)). Poorly designed subgroups can have a significant impact on purchase decisions. Furthermore, the relationship between high-quality ordering and partitioning is crucial. While successful ordering increases the focus on a small number of high-quality options, bad ordering magnifies the impact of partitioning, potentially exposing consumers to substandard options ([Dellaert et al., 2022](#)).

The combination of ordering and partitioning in e-commerce has the potential to significantly improve consumer choice. However, the realisation of these benefits is dependent on the quality of the ordering model used ([Dellaert et al., 2022](#)). Partitioning can, paradoxically,

hurt consumers in circumstances where the order is based on a low-quality user model ([Xu & Kim, 2008](#)). For ordering and partitioning to work together, the ordering model must reliably forecast which options are most appealing to customers.

### Using Nudge to Address Choice Architecture Issues

As previously mentioned, to impact consumer decision-making processes, the field of e-commerce significantly relies on choice architecture tools, namely ordering and partitioning. These tools strategically structure product displays. They do, however, create several challenges, such as the need for effort reduction and highlighting the effects of the salience bias. Effort reduction implies that when decision-making is challenging, people tend to choose defaults or status quo options ([Cai & Xu, 2008](#)). The salience bias shows that consumers prefer to focus on prominent products or information, which can be exacerbated in e-commerce scenarios ([Caraban et al., 2019](#)).

These difficulties can be efficiently alleviated with the application of default and social norm nudges. Defaults simplify decision-making processes by providing a low-effort option that reduces cognitive strain ([Cai & Xu, 2008](#)). They also offer implicit recommendations, gradually directing individuals towards specific choices that are consistent with society's preferences ([Keller et al., 2011](#)). Similarly, social norm nudges take advantage of people's tendency to comply with societal norms. These nudges take advantage of social influence processes, affecting behaviour based on perceived societal preferences ([Johnson et al., 2012](#)). They effectively align individuals' choices with societal norms or encouraged activities, overcoming the issues of choice architectures such as effort reduction, informational norms, and salience biases. Hence, default and social norm nudges are effective solutions for amending the difficulties associated with ordering and partitioning tools in e-commerce choice architectures. These nudges not only help customers make better decisions, but they also discreetly push them towards choices that are consistent with societal expectations and preferences while maintaining individual freedom of choice.

## **Nudging**

[Thaler and Sunstein \(2008\)](#) defined the concept of nudge in their influential book. The authors define nudging as a choice architecture intervention aimed at changing behaviour predictably without constraining options or significantly modifying economic incentives ([Thaler & Sunstein, 2008](#)). Nudging does not entail convincing people of the benefits of specific courses of action that will benefit their long-term well-being. Instead, it modifies the choice environment so that when individuals follow their instincts, employing familiar mental shortcuts, the most prominent option available to the consumer is likely to increase their welfare as well as the welfare of society more broadly ([Moseley, 2020](#)). Initially conceived as behavioural economic tools for public policy, nudges are now being used in a variety of situations, including marketing and digital contexts ([Keller et al., 2011](#)). Empirical studies show that the usefulness of nudges varies depending on the context. While many nudges have a considerable impact on target behaviours or attitudes, efficacy varies, emphasising the importance of subtle contextual considerations ([Thaler & Sunstein, 2008](#); [Moseley, 2020](#)).

Nudges, which are frequently incorporated within choice architectures, are based on libertarian paternalism principles, to influence behaviour while protecting freedom of choice ([Johnson et al., 2012](#)). Libertarian paternalism combines two ideas: 'libertarian,' which emphasises freedom of choice, and 'paternalism,' which involves instruction or help for enhanced decision-making ([Thaler, 2018](#)). It encourages people to make better decisions while giving them the freedom to opt-out or make alternate choices if they so wish ([Moseley, 2020](#)). To emphasise an important point, nudges should avoid limiting the range of options accessible to consumers or generating significant changes in their incentives ([Thaler, 2018](#)).

Nudges are employed in a variety of disciplines, most notably marketing and new digital contexts ([Keller et al., 2011](#); [Sobolev, 2021](#)). Some contexts where this tool has influenced consumer decisions in marketing is through enrolment defaults, for example influencing car-related choices and increasing consumer participation in email marketing ([Keller et al., 2011](#)).

The digital ecosystem has seen an unparalleled increase in the use of nudges, notably in online retail platforms ([Caraban et al., 2019](#)). Retailers heavily use digital nudging to increase consumption rates and enhance traditional marketing approaches with digital innovation ([Sobolev, 2021](#)). This highlights the universality and omnipresence of nudges in the modern digital age. At its foundation, digital nudging makes use of developing digital technology and behavioural science findings. Choice architecture nudges, such as defaults, integrate easily into

digital settings, gradually influencing user decisions ([Sobolev, 2021](#)). Furthermore, the adaptability and customisation inherent in digital nudging are essential. Individual preferences and contextual clues are dynamically adapted by these tactics, allowing for more precise and effective nudges ([Sobolev, 2021](#)). Digital nudges adapt interventions by leveraging contextual knowledge and user-specific data, assuring relevance and maximizing impact ([Caraban et al., 2019](#)).

As mentioned above one of the most applied nudges in the digital context is the default nudge. In addition, another type of nudge fairly easy to apply in the mentioned context is the social norm nudge.

### Default Nudge

Defaults, a key component of behavioural economics decision architecture, are settings or options that are automatically allocated to persons who do not actively choose ([Johnson et al., 2012](#)). They serve as externally determined options, influencing considerably decision-making.

Default nudges steer decisions softly without limiting options or significantly modifying incentives ([Thaler & Sunstein, 2008](#)). This idea is aligned with Thaler and Sunstein's core concept of nudge, which in the sense that nudges attempt to enhance decisions while retaining freedom and autonomy ([Thaler, 2018](#)). Loss aversion, inertia, and the status quo bias all play a role in default adherence. Due to the perceived disadvantages involved with deviating from defaults, people tend to adhere to them ([Keller et al., 2011](#)). This inertia demonstrates the tendency for the default to become the expected conclusion when people do not actively choose. The "status quo bias" emphasises the cognitive work necessary to choose a different option, which contributes to default acceptance ([Caraban et al., 2019](#)).

Defaults are effective not only through the above-mentioned psychological effects but also because consumers perceive them to be implicitly recommended or the best option ([Keller et al., 2011](#)). This behavioural tool reduces the need for substantial deliberation, allowing consumers to make choices without the need for additional research or pondering. Defaults are powerful nudges that influence decisions by emphasising the benefits of the status quo while providing an easy way out of otherwise challenging choices ([Goswami & Urminsky, 2016](#)). Similar to anchoring and positioning strategies used in choice architectures, default nudges

influence decision-making processes by serving as starting points for consideration or changing the visual setup of options, potentially swaying consumers towards default choices ([Goswami & Urminsky, 2016](#); [Caraban et al., 2019](#)).

Moreover, setting defaults to align with the choice selected by the majority when individuals actively pick, free of time constraints or any existing default, is an advantageous method ([Johnson et al., 2012](#)). Notably, because they are non-coercive, defaults have a distinct benefit over more forceful paternalistic interventions ([Keller et al., 2011](#)).

Therefore, we could hypothesise that setting a default order nudge on the presented choices, with the first option displayed being the product that was most chosen in a recent time frame, could enhance the decision-making process. Thus, we could ask “Do consumers, knowing the reasoning behind product display ordering, consider buying products that appear in the first position of the presented set?” (RQ1). Moreover, we could also question if other factors of choice architecture are impacted by default nudges, namely purchase satisfaction and speed of decision: “Does the speed of decision-making increase when the default order of presented options is altered so that the first product displayed is the most purchased one?” (RQ2) and “Is consumers’ overall purchase happiness increased when the default order of products display is changed to present the most purchased product in the 1<sup>st</sup> position?” (RQ3). To answer these research questions, the following hypotheses were drafted:

- 1A. By changing the default order of the options, more customers will consider it in their decision-making.
- 1B. By changing the default order of the options conversion to the product page will increase.
2. By changing the default order of the options the speed the consumer decision-making will increase.
3. By changing the default order of the options consumer purchase satisfaction will increase.

### Social Norm Nudge

Social norm nudges work on the assumption that people are inclined to adhere to perceived social standards. These nudges rely on social influence, a process that capitalises on people's tendency to align with the behaviour of others in their social group ([Talib & Saat, 2017](#)). The success of norm-nudging is dependent on evoking social expectations that lead to

desired behaviour ([Caraban et al., 2019](#)). Reference groups, which include individuals who are important to the decision-maker, have a substantial impact on norm-nudging impact. Individuals' judgements of normal or acceptable behaviour are influenced by norm-nudging based on their relevant social networks ([Bicchieri & Dimant, 2023](#)). Empirical evidence supports the usefulness of norm-nudging in a variety of contexts. For example, [Goldstein et al. \(2008\)](#) demonstrated how notifying hotel guests about towel reuse behaviour raised reuse rates considerably, especially when the reference group was identified as people sharing the same room.

However, individuals with independent behaviours controlled by norms or moral rules are less vulnerable to these nudges. The contextual relevance of the norm and its compatibility with the audience's values and aims have a substantial impact on efficacy ([Bicchieri & Dimant, 2023](#)). The alignment of the intended social norm with the reference group, social identity, and cultural norms is critical. Adapting information to the circumstances increases its impact, but interventions viewed as manipulative or in opposition to established expectations may have a detrimental effect on effectiveness ([Bicchieri & Dimant, 2023](#)). To properly leverage norm-nudging, careful design and implementation are required. Choice architects must manage these factors to harness the power of social norms for beneficial behaviour change, improving both individual and societal well-being.

Bearing this in mind, we could ask ourselves “Are consumers more willing to consider buying products that show social proof of quality?” (RQ4), leading us to, respectively, hypothesis 4A. and 4B.: “By adding a tag stating “Most popular option” to the product, more consumers will consider it in their decision-making” and “By adding a tag stating “Most popular option” to the product, conversion to the product page will increase”. Building on this, we could also theorize that by applying a social norm nudge to the choice architecture we could impact factors that contribute to a better decision-making process, such as speed of decision and overall purchase satisfaction. Specifically, we could ask “Is the speed of decision-making increased when social proof is included in the choice architecture?” (RQ5) and “Is consumers’ purchase satisfaction increased in the presence of social proof?” (RQ6). To answer these questions two hypotheses are formed: 5. “By adding a tag stating “Most popular option” consumer decision-making speed will increase” and 6. “By adding a tag stating “Most popular option” consumer purchase satisfaction will increase”.

## **Ethical concerns**

On a final note, it is crucial to mention the ethical concerns related to the application of nudges in choice architecture. Nudges function within the paradigm of libertarian paternalism, protecting freedom of choice while pushing towards better-suited choices. Individual preferences, driven by personal preferences and a variety of contextual circumstances, create issues that nudges may struggle to fully address ([Thaler & Sunstein, 2008](#)). Moreover, the complexities of decision-making processes provide a challenge. Namely, access to information, which is critical for making informed decisions, may not always coincide with nudges' capacity to offer options appropriately ([Caraban et al., 2019](#)). Furthermore, when nudges interact with the decision-making process, unintended consequences, an inherent risk, may develop, potentially leading to unexpected results ([Steffel et al., 2016](#)).

It is critical to recognise the fundamental differences between nudging and marketing techniques, despite apparent parallels in influencing consumer behaviour. Nudges, such as default and decoy techniques, work within the area of choice architecture without removing options or dramatically affecting decision-makers incentives ([Caraban et al., 2019](#)). These nudges use customers' cognitive biases to drive decisions, but the decision-maker or nudged individual is the primary beneficiary. For example, on one hand, defaults streamline decision-making by providing a simple, default alternative that benefits the decision-maker without forcing them to select a certain option. On the other, decoys, which resemble marketing strategies, frequently exploit consumers' prejudices to favour the seller's profit, attempting to maximise it at the expense of the consumer's well-being ([Thaler, 2018](#); [Congiu & Moscati, 2022](#)). Marketing strategies, such as product placement or suggestive labelling like "Amazon's Choice," are similar to nudges in that they preserve freedom of choice while discreetly using cognitive biases ([Congiu & Moscati, 2022](#)). However, they often prioritise increasing seller profits over solely improving consumer welfare.

This distinction raises the critical question of how to distinguish nudges that assist individuals or society from marketing strategies that primarily promote the seller's interests. Nudges can be pro-self or pro-social, helping individuals or society, whereas commercial nudges may improve the welfare of both the firm and the consumer but often prioritise commercial gains ([Congiu & Moscati, 2022](#)). As a result, while both nudging and marketing exploit cognitive biases, the important distinction rests in their core goals: Nudges seek to promote the well-being of the nudged individual or community, whereas marketing techniques frequently seek to maximise commercial advantages, sometimes at the expense of customer

well-being ([Congiu & Moscati, 2022](#)). Thus, nudging and marketing methods function at an ethical crossroads.

Consumer awareness and understanding of the implications of nudges are critical to their ethical acceptability. When consumers are aware of nudges, their decision-making autonomy is preserved ([Johnson et al., 2012](#); [Steffel et al., 2016](#)). However, nudges that operate invisibly or impose considerable transition costs raise ethical questions about the preservation of choice. Nudging criticism frequently focuses on claims of manipulation, however, not all nudges are coercive ([Johnson et al., 2012](#)). Some nudges openly encourage consumers to think about their decisions, allowing them to distinguish and assess persuasive tactics ([Johnson et al., 2012](#); [Steffel et al., 2016](#)). This promotes critical thinking while also enabling active decision-making and minimising subtle influences.

Finally, to address ethical concerns, there is rising support for disclosing nudging objectives. Consumers are enabled to critically examine nudging attempts when the aim of defaults is revealed, enabling informed decision-making, and giving safeguards against covert manipulation ([Steffel et al., 2016](#)). Proposals for disclosure have developed as a protective mechanism to promote responsible use of nudges, intending to protect consumers from potentially manipulative nudging practices ([Steffel et al., 2016](#)).

**Methodology**

Proceeding the analysis of secondary data an experiment was designed to study the impact of default and social norm nudges on consumers’ decision process and test the developed hypothesis. This research method was chosen based on the findings of the previously discussed literature, namely [Sobolev \(2021\)](#) stated that nudge effects can be rapidly evaluated with online experiments. The experiment was employed to test the effects of nudges on conversion rate to the product page and nudged option presence on the decision consideration set, as well as, to assess its effect on decision speed and overall purchase satisfaction that directly impact the conversion to buyer rate and ultimately the consumer’s decision quality. Hence, the default and social norm nudges act as mediators in the studied choice architecture:

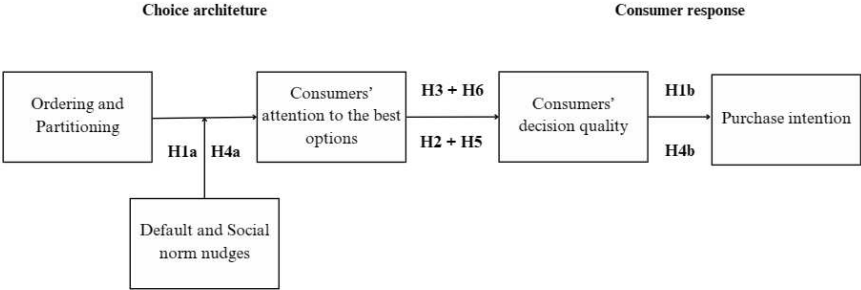


Figure 1: Conceptual Framework

The experiment was administered through a Qualtrics survey using a randomized experiment technique. By using a survey, it is possible to gather the opinions of diverse consumers which grants more accuracy to the results presented. The goal of this experiment is thus to test the impact of nudges on consumer decisions due to changes in choice architecture that ideally lead to better decision-making. In the questionnaire, participants were randomly assigned to a single-factor design with three levels: Control group, Default nudge treatment, and Social norm nudge treatment. The control group was added to the experiment to measure more accurately the impact of each nudge, since if the impact of each nudge was simply compared to the other one, biased conclusions could be developed. Hence, in the analysis of the experiment results of each treatment were compared to the control group’s results, as well as the group results in a pre-post experiment comparison. The analysis of the collected data was conducted in SPSS, where tests appropriated for in-between-subject design were deployed. Namely, independent sample t-test and One-way ANOVA were the most used tests, and cross-tabulations and linear regression were also applied.

The structured survey was administered to the target population, where participants, through a direct approach, faced the same order of questions. The only block that was different for the respondents depended on the treatment group they were randomly assigned to. Thus, each person only saw either one of the experiment treatments or the control group version, i.e., using in-between subjects' design. It is important to underline that all the participants were aware of the anonymity of their answers, voluntarily participated in it, and were aware of the goal of the questionnaire. Qualtrics online platform was chosen for the development and distribution of the online survey so that the maximum number of individuals was reached in the minimum amount of time. The survey was distributed mainly via social media channels, namely WhatsApp. The randomization tool of the platform was deployed to ensure the randomization of the treatments displayed to respondents. Two advantages of this platform are that the link generated by it creates an anonymous login and the fact that the link can be accessed wherever and whenever granting flexibility in terms of the location and duration when completing the questionnaire. In contrast, due to the mentioned advantages control is lost in terms of the respondents' surroundings, which can significantly impact results, and possible questions that may arise during the survey are left unanswered.

The choice of the product used in the experiment was made to enhance the realism and generalizability of the findings while minimizing possible biased choices. The technology accessories subcategory was selected due to the utilitarian nature of its products, making its choice architecture a relatively simple one. Since consumers can understand more information and better evaluate it in choices that require less cognitive effort ([Peters et al. 2007](#)), utilitarian products' choice architecture is easily altered to include a nudge where consumers can apply heuristics turning the decision into a fast and seamless one ([Caraban et al., 2019](#)). Within this product category, Computer mouse accessories were chosen for three reasons. First, computer mice are popular in online shopping. Secondly, student respondents, which were the ones that were easily reached considering the resources available, are relatively familiar with this type of technology accessory. Thirdly, computer mice are products with several attributes which make them suitable for multi-attribute decisions.

The survey's questions were based on the presented research questions and hypothesis so that the data from the required variables for the analysis were generated. With this in mind, the survey was structured into 6 parts: introduction to the survey, past consumption habits, opinion regarding current website navigation, experiment, post-experiment, and demographics.

To define the past consumption habits of respondents a framework similar to the one used by [Cai and Xu \(2008\)](#) was employed. In this section purchase habits and knowledge about the product were assessed, and 5 and 7-point Likert scales were used. Additionally, in this section purchase satisfaction was also evaluated as a manipulation check. To maintain clearness of results the concept of customer satisfaction was defined in the survey. In the initial part of the survey respondents were asked to define the concept of customer satisfaction and in a later section, the post-experimental block, an academic definition was provided. This strategy was devised so that results could be analysed under a common definition of the somewhat abstract concept of purchase satisfaction. By doing so, the multiple possible definitions of the concept were removed, which could later lead to misinterpreted results, and a concise one was provided. The definition used was the one developed by [Lin & Wang \(2006\)](#) which is adapted to a similar context to the studied one.

In sequence, the survey's third block focuses on e-commerce website attributes evaluation. These were assessed to get a better grasp of which had the most significant impact on decision-making. The set of attributes is a mix of e-commerce attributes present in [Dellaert et al. \(2022\)](#) and product-related information which are often presented in the studied context, based on [Simonson's \(1999\)](#) framework. The attributes were evaluated on a 5-point Likert scale and are the following: product design, product description, reviews, tags with extra information, number of products per page, total number of products available, and the possibility to rearrange the order of product presentation. In the following block of questions, respondents were exposed to one of the two experimental scenarios or to the control group scenario. Ideally, a third of the sample would be exposed to the control group scenario, another to the default nudge scenario, a purchasing scenario which was similar to the control group scenario in terms of visual inputs, and the last third exposed to the social norm nudge scenario which contained a tag showcasing the "Most Popular" option. In the post-experimental block, all 115 participants were asked to answer the same set of questions. They were asked what their final choice was, as well as the choices that were considered in the decision process. These questions were developed based on [Cai and Xu \(2008\)](#) questionnaire. Additionally, respondents were asked to reevaluate the attributes from the second block of questions. This question was added as a manipulation check so that it was possible to measure the impact of each attribute in the simulated purchase environment and to compare this data to the participants' evaluation of an actual purchase situation. Again, a 5-point Likert scale was used to evaluate the attributes'

importance. To end the questionnaire participants were asked to answer a set of demographic questions.

Lastly, before the overall distribution of the online survey, a pre-test was conducted with 6 participants. Each one answered the survey alone without the influence of the researcher or other participants. Following the pre-test, adjustments were made to clarify the questions and to streamline the survey's flow.

### **Stimuli Development**

The experiment block goal was to emulate an online purchase environment. For this purpose, a fictional website was created. Respondents were randomly assigned to one of three scenarios as mentioned previously. All aspects of the scenarios were equal except for one detail in the social norm nudge treatment. In this treatment, a tag stating “Most Popular” was added to the first product listed ([Figure 3](#)). In the other two scenarios the visual aid is exactly the same ([Figure 2](#)), the only differentiating aspect is the description provided before the choice.

To remove the influence of any existing preferences regarding prevailing retail websites a fictional website was created since preconceived opinions regarding specific e-commerce sites could positively or negatively affect results. By doing so, the results obtained are less likely to be influenced by preexisting opinions. Although the presented visual aid was not intended to resemble any specific website it still had the characteristics necessary for the respondents to recognise it as one, i.e., the visual aid was drafted in a way that it would not damage the dependent variable results. Likewise, to minimize the influence of brands on choice, all logos and brand references were removed from all products used in the stimuli.

To complement this visual aid an introduction was provided before it ([Appendixes D, E, and F](#)). In it, the full purchase context is described, as well as which nudges are applied and how they are intended to influence decisions. The introduction of all three scenarios contained an explanation of the trigger that created the purchase situation, a disclaimer regarding the resemblance to an existing website, and a description of how to make the choice. An extra explanation of the functioning of the nudging tool was added so there is full transparency on how the nudge will affect choice, i.e., so that participants are aware and understand the implications of the nudges.

## **Manipulation Checks**

To confirm the level of perceived knowledge of the participants' level of knowledge was used as a manipulation check. Respondents were asked to rank their knowledge regarding the product computer mouse on a 5-point Likert scale, where 1 stands for "I know for what it is used" and 7 for "I am an expert on the matter". After verifying the respondent's knowledge level and past consumption habits in online retailing, participants were asked to define purchase satisfaction. This manipulation check was performed to ensure that participants understood the concept. Respondents were asked to select the sentences that better describe the concept: "Feeling content with the final choice.", "Repetition of the purchase.", "Feeling satisfied with the decision-making process.", and "Positive evaluation of the consumption journey."

Afterwards, participants were inquired about their perceptions concerning the website's characteristics. To do so they evaluated the importance of 7 attributes of an e-commerce website on a 5-point scale: number of products per page, product reviews, number of total products available, the possibility of ordering the displayed products, descriptions, tags with extra information, and product design. This question was asked in two moments. First, before the experiment, respondents were asked to evaluate the elements in terms of their impact on past decision-making processes and then, after the experiment participants faced the same question. This question design was developed as such so that the elements' relevance could be compared before and after the experiment. The manipulation check results are provided in the next section.

## **Variable Description**

The dependent variable is purchasing intention which was manipulated by presenting respondents with a list of 6 computer mice with or without the change in choice architecture, deployed by the presence of one of the nudges. The dependent variable was evaluated by a 5-point Likert scale (1 – Extremely unlikely to purchase to 5 – Extremely likely to purchase). This variable was developed based on the definition of [Pavlou \(2003\)](#), which defines (online) purchase intention as "a situation where a consumer is willing and intends to make online transactions".

The independent variables used were purchase satisfaction, decision speed, conversion to the product page (i.e., choosing option A), and presence in the consideration set. A 7-point Likert scale was used to measure purchase satisfaction as defined by [Kuo et al. \(2009\)](#). In this paper, purchase satisfaction is defined as the post-purchase evaluation and feelings regarding the

overall purchase experience in an e-commerce environment. The independent variable purchase satisfaction was measured by three-item measures taken from previous measures of the overall level of customer satisfaction ([Kuo et al., 2009](#)). Particularly, respondents were asked “How satisfied would you be with your choice?” with a 1-7 scale where 1 stands for “Very dissatisfied” and 7 for “Very satisfied”. Decision speed was directly calculated on the Qualtrics platform and conversion to the product page and presence in the consideration set were directly computed from the data collected by counting the number of times option A was chosen between the six available options A to E. Finally, the Default and Social norm nudges were employed as moderators.

### **Sample Description**

In total, the survey had 215 responses of which 115 were valid and complete. Each respondent was randomly assigned to one of the two treatments or the control group: 40 participants were exposed to the default nudge treatment, 37 participants responded to the social norm nudge treatment, and the final 38 were assigned to the control group.

## **Results and Discussion**

### **Results**

In total, the survey has 115 valid responses, such that: 40 participants were exposed to the default nudge treatment (34.79%), 37 participants responded to the social norm nudge treatment (32.17%), and the final 38 were assigned to the control group (33.04%). Among the sample collected, female respondents accounted for 41.7% of the total population, male respondents accounted for 57.4%, and 0.9% preferred not to disclose the information. Most of the survey respondents reported to be in the 18-25 years old age bracket (41.7% of the total sample), and the 40-46 and 47-53 age brackets are the 2<sup>nd</sup> groups with the highest weight in the sample representing each 14.8% of the total sample. In terms of educational background, graduate participants represent 40%, postgraduates 23.5%, and people with a master's degree account for 22.6%. Most participants had already purchased a technology accessory (88.7%), being the most purchased products Cases, Headphones, and Chargers, and 52.2% of total respondents purchased a technology accessory at least once every six months. Moreover, 54% of participants considered having at least "Average knowledge" regarding computer mice, 90.4% stated to be at least "Slightly happy" with past purchases, and 73.9% took more than 10 minutes to complete a decision.

In terms of the evaluation of e-commerce website attributes, the top three valued attributes were reviews, product descriptions, and product design. If this impact is filtered in terms of contribution to decision speed and purchase satisfaction the following results are observed: Firstly, the three attributes that impact the speed of decision the most are reviews, the possibility to order the displayed products, and product description; Secondly aligned with general findings, reviews, product description, and product design are the three product attributes that impact purchase satisfaction the most for the respondents. Lastly, to detect the presence of outliers a multivariate analysis was performed. The Mahalanobis test was conducted where the distances were evaluated using a significance level of  $p < 0.001$ . Since all variables presented p-values below 0.001 they were deemed significant, and none was omitted so no outliers were detected.

### Manipulation check results

The first manipulation check performed is related to the level of knowledge of participants regarding computer mice. The level of knowledge items was adapted from Smith and Park's (1992) study, similar to Cai and Xu (2008). The knowledge levels are: *“I feel very knowledgeable about digital cameras”*; *“I feel very confident about my ability to tell the difference in quality among different brands of digital cameras”*; *“If I were to purchase a digital camera today, I would need to gather very little information in order to make a wise decision”*. A one-way ANOVA was performed to test product knowledge levels among treatments. Significant differences in means were not found considering a 5% significance level. The ANOVA test presented a p-value of 0.094 above the critical value of 0.05. Therefore, it can be stated that there aren't statistically significant differences between the level of knowledge of the groups, thus the analysis can continue. Additionally, Levene's test of homogeneity of variances presented a p-value higher than 0.05, thus the null hypothesis of different variances is not rejected.

**Table 1:**  
ANOVA

Q33\_knowledge

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.823	2	2.911	2.419	.094
Within Groups	134.821	112	1.204		
Total	140.643	114			

Table 1: One-way ANOVA on Knowledge

An additional check was conducted to ensure the correct randomization of treatments. One-way ANOVA tests for gender, age, and education level were performed. None of the three tests was significant, presenting all p-values above 0.05, thus there is no significant difference in terms of gender, age, and education level between the three groups. Moreover, all variables presented p-values higher than 0.05 for Levene's test of homogeneity of variances, thus there is homoscedasticity. Hence, it can be concluded that the randomisation was adequate.

A manipulation check regarding the definition of purchase satisfaction was performed to ensure that participants understood the concept. To test the association between the provided definitions of purchase satisfaction a Chi-squared test was performed.

The results indicated a significant relationship between the grouping variables and the choice of option A ( $\chi^2(13) = 115, p < .001$ ), thus participants acknowledge that purchase satisfaction is not only limited to feeling content with a purchase and analysis can proceed.

**Table 2:**  
*Chi-Square Tests*

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	115.000 <sup>a</sup>	13	<.001
Likelihood Ratio	103.091	13	<.001
N of Valid Cases	115		

Table 2: Chi-Squared Test on Purchase satisfaction

The third manipulation check concerns website attribute relevance. This check was deployed to understand if respondents noticed the applied nudge (if applicable). Participants were asked to evaluate a set of website attributes, by using a 5-point scale, before and after the experimental treatment. To assess if there was a statistically significant difference between the means of each attribute for each condition a one-way ANOVA was conducted. Almost all attribute means presented significance values above 0.05 except pre-experiment product design and post-experiment product reviews. The first attribute presented mean values of 4.39 for the control group, 3.90 for the default nudge group, and 4.30 for the social norm nudge group. This test presented a p-value of 0.07 which, if we expand the significance level to 10%, is statistically significant. The second attribute presents means of 3.74, 3.20, and 3.92 for the control, default nudge, and social norm nudge groups respectively. This one presented a p-value of 0.069 that, again if the significance level is expanded to 10%, is statistically significant. Thus, it is concluded that previous to the experiment there weren't any significant differences in attribute evaluation across the groups, except for product design, therefore there was a common starting point for all groups. Furthermore, similar to pre-experimental results there is no statistically significant difference in element evaluation except for product reviews in post-experimental data. This last item was more relevant for the social norm nudge group, followed by the control group, as intended. All things considered, the manipulation was successful.

## Hypothesis testing

Hypothesis testing was conducted in three parts. First, the data concerning the default nudge experiment was analysed, followed by the social norm nudge experimental data, and concluded with further findings. The following subsections present the results necessary to corroborate the developed hypothesis. Regarding the analysis structure, for each dependent variable one-way ANOVAs and independent-sample t-tests were conducted to assess the overall effect of the two treatments and to compare treatments stated in each hypothesis. In addition, Tukey’s post hoc tests were applied to ensure hypothesis significance and to prevent the escalation of the influence of Type I error in the ANOVA. This last test was performed since there were possible pairwise comparisons between the three treatments. On a final note, throughout the analysis the used notation to represent the groups is as follows: Control group is group “0”, Default nudge group is group "1", and the Social norm nudge group is group “2”.

### **Experiment 1 – Default Nudge**

**H1A:** By changing the default order of the options, more customers will consider it (the first product displayed) in their decision-making.

In order to test the effect of the default nudge on the set of considered options a Cross-tabulation analysis was performed between the group variables and the choice of option A, which was the nudged option. The analysis reveals that the option in question is considered fewer times in the default nudge group (29.8%) than in the control group (35.1%).

**Table 3:**

*\$consider\_set\*Group Crosstabulation*

			Group			Total
			0	1	2	
Consideration_set <sup>a</sup>	V47_Option_A	Count	20	17	20	57
		% within \$consider_set	35.1%	29.8%	35.1%	
	V48_Option_B	Count	4	12	3	19
		% within \$consider_set	21.1%	63.2%	15.8%	
	V49_Option_C	Count	12	17	12	41
		% within \$consider_set	29.3%	41.5%	29.3%	
	V50_Option_D	Count	4	7	4	15
		% within \$consider_set	26.7%	46.7%	26.7%	
	V51_Option_F	Count	16	11	11	38
		% within \$consider_set	42.1%	28.9%	28.9%	
	V52_Option_E	Count	7	9	10	26
		% within \$consider_set	26.9%	34.6%	38.5%	
Total		Count	38	40	37	115

Percentages and totals are based on respondents.

Table 3: Crosstabulation between groups and consideration set

A Chi-squared test was performed to understand if the results were significantly different. The results indicated an insignificant relationship between the grouping variables and the choice of option A ( $\chi^2(2) = 1.24, p = .538 < .05$ ). Therefore, it can be concluded that there is not a significant relationship between the variables, consequently Hypothesis 1A is not supported.

**Table 4:**  
*Chi-Square Tests*

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.240 <sup>a</sup>	2	.538
Likelihood Ratio	1.244	2	.537
Linear-by-Linear Association	.013	1	.909
N of Valid Cases	115		

<sup>a</sup> 0 cells (0.0%) have expected count less than 5. The minimum expected count is 18.34.

Table 4: Chi-Square tests on Consideration set

**H1B:** By changing the default order of the options conversion to the product page will increase.

Similar to the first experiment, a Cross-tabulation analysis was performed between the group variables and the choice of option A, which was the nudged option. The goal of this analysis was to understand the effect of the social norm nudge on conversion to the product page. It is possible to observe that option A was chosen fewer times in the default nudge group (23.1%) than the control one (30.8%).

**Table 5:**  
*\$final\_choice\*Group Crosstabulation*

			Group			Total
			0	1	2	
\$final_choice <sup>a</sup>	V40_Option_A	Count	12	9	18	39
		% within \$final_choice	30.8%	23.1%	46.2%	
	V41_Option_B	Count	1	5	1	7
		% within \$final_choice	14.3%	71.4%	14.3%	
	V42_Option_C	Count	10	15	5	30
		% within \$final_choice	33.3%	50.0%	16.7%	
	V43_Option_D	Count	2	4	1	7
		% within \$final_choice	28.6%	57.1%	14.3%	
	V44_Option_F	Count	11	3	9	23
		% within \$final_choice	47.8%	13.0%	39.1%	
	V45_Option_E	Count	1	4	3	8
		% within \$final_choice	12.5%	50.0%	37.5%	
Total	Count	37	40	37	114	

Percentages and totals are based on respondents.

Table 5: Crosstabulation between groups and final choice

In order to validate these results a Chi-squared test was performed. It indicated that there is a significant relationship between the grouping and final choice variables ( $\chi^2(2) = 6.002, p = .05$ ). Thus, it can be stated that participants in the default nudge group choose option A fewer times than the ones from the control group, consequently, Hypothesis 4B is rejected.

**Table 6:**

*Chi-Square Tests*

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6.002 <sup>a</sup>	2	.050
Likelihood Ratio	5.988	2	.050
Linear-by-Linear Association	2.370	1	.124
N of Valid Cases	115		

<sup>a</sup>. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 12.55.

Table 6: Chi-Square Tests on Final choice

**H2:** By changing the default order of the options, the speed of consumer decision-making will increase.

For decision speed, measured through First click time, one-way ANOVA results show that there was not a significant effect on consumers' decision speed ( $F(2,112) = 1.399, p = .251 > .05$ ). The mean score for the control group,  $M_{\text{Control}} = 11.29$  is not significantly different than the default nudge treatment  $M_{\text{Default}} = 9.82$ . Tukey's post hoc test indicated a contrasting result showcasing a meaningful distinction between the control and default nudge groups ( $p = .012$ ).

**Table 7:**

*ANOVA*

		Sum of Squares	df	Mean Square	F	Sig.
Q46_First Click	Between Groups	474.983	2	237.491	1.399	.251
	Within Groups	19009.132	112	169.724		
	Total	19484.115	114			
Q35_sati_after	Between Groups	48.912	2	24.456	9.280	<.001
	Within Groups	295.175	112	2.635		
	Total	344.087	114			

Table 7: One-way ANOVA on First click and Purchase satisfaction

**Table 8:**

*Descriptives*

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Q46_First Click	0	38	11.29563	17.683032	2.868567	5.48336	17.10790	.000	81.254
	1	40	9.82253	12.631093	1.997151	5.78291	13.86214	.000	71.001
	2	37	6.38786	5.815164	.956007	4.44899	8.32674	.000	24.145
	Total	115	9.20423	13.073381	1.219099	6.78920	11.61925	.000	81.254
Q35_sati_after	0	38	5.87	1.510	.245	5.37	6.36	3	7
	1	40	4.80	1.937	.306	4.18	5.42	1	7
	2	37	6.35	1.338	.220	5.91	6.80	2	7
	Total	115	5.65	1.737	.162	5.33	5.97	1	7

Table 8: Descriptives of First click and Purchase satisfaction

Additionally, an Independent-samples t-test was performed to confirm ANOVA's results. Similarly, the t-test's results indicated a lack of significance between the groups ( $t(76) = .425, p = .336$ ) showing no meaningful difference between the groups' mean values. In light of these inconsistent results, Hypothesis 2 is not supported.

**Table 9:**

*Independent Samples Test*

		Levene's Test for Equality of Variances				t-test for Equality of Means					
		F	Sig.	t	df	Significance		Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						One-Sided p	Two-Sided p			Lower	Upper
Q46_First Click	Equal variances assumed	632	.429	.425	76	.336	.672	1.473107	3.465996	-5.430023	8.376236
	Equal variances not assumed			.421	66.696	.337	.675	1.473107	3.495324	-5.504173	8.450386

Table 9: Independent Samples Test on First Click

**H3:** By changing the default order of the options (average) consumer purchase satisfaction will increase.

In contrast, there is a significant difference in purchase satisfaction between the control and default nudge groups as indicated by the ANOVA ( $F(2, 112) = 9.280, p < .001$ ) (Table 7). The displayed mean scores for purchase satisfaction are  $M_{\text{Default}} = 4.80$  and  $M_{\text{Control}} = 5.87$  (Table 8). Thus, Hypothesis 3 is rejected.

## Experiment 2 – Social Norm Nudge

**H4A:** By adding a tag stating “Most popular option” to the product, more consumers will consider it in their decision-making.

To analyse the effect of the social norm nudge on the set of considered options a Cross-tabulation analysis was performed between the group variables and the choice of option A (the

nudged option). The analysis reveals option A being considered in the same proportion in the social norm nudge group (35.1%) and the control group (35.1%) (Table 3). Nonetheless, if the data is carefully analysed it is possible to observe that option A was considered by 20 out of 37 participants of the social norm nudge group and 20 out of 38 participants of the control group. Thus, option A is considered more times in the social norm nudge group.

A Chi-squared test was performed to understand if the results were significantly different. The results indicated an insignificant relationship between the grouping variables and the choice of option A ( $\chi^2(2) = 1.24, p = .538 < .05$ ) (Table 4). Therefore, it can be concluded that there is not a significant relationship between the variables, consequently, Hypothesis 4A is not supported.

**H4B:** By adding a tag stating “Most popular option” to the product, conversion to the product page will increase.

A Cross-tabulation analysis was performed between the group variables and the choice of option A, which was the nudged option, to understand the effect of the social norm nudge on conversion to the product page. Option A is chosen more times in the social norm nudge group (46.2%) than the control one (30.8%) (Table 5). To validate the results a Chi-squared test was performed, indicating a significant relationship between the grouping and final choice variables ( $\chi^2(2) = 6.002, p = .05$ ) (Table 6). Consequently, it can be concluded that participants in the social norm nudge group choose option A more times than the ones from the control group. Thus, Hypothesis 1B is accepted.

**H5:** By adding a tag stating “Most popular option” consumer decision-making speed will increase.

Similar to the first groups’ analysis, a one-way ANOVA was conducted to assess the significance of the differences in decision time, measured by the First click variable, between the control and social norm nudge groups. The observed means are, respectively,  $M_{\text{Control}} = 11.29$  and  $M_{\text{Social}} = 6.38$  seconds (Table 8). Again, one-way ANOVA results showed that there is not a significant effect on consumers’ decision speed ( $F(2,112) = 1.399, p = .251 > .05$ )

(Table 7). Tukey’s post hoc test indicated an analogous result not showing a meaningful distinction between the control and social norm nudge groups.

In addition to the one-way ANOVA, an Independent-samples t-test was performed. Results are aligned with previous ones. Levene’s test for equality of variances indicated that there is a significant difference between the two groups' variances, which influences the reliability of the t-test. This resulted in a (two-sided) p-value of 0.113 which is above the 5% significance level, suggesting that there is no statistically significance difference between the mean values’ of the groups. Concluding, it can be stated that decision time is not significantly different between groups and Hypothesis 5 is not supported.

**Table 10:**

*Independent Samples Test*

		Levene's Test for Equality of Variances				t-test for Equality of Means					
		F	Sig.	t	df	Significance		Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						One-Sided p	Two-Sided p			Lower	Upper
Q46_First Click	Equal variances assumed	6.932	.010	1.606	73	.056	.113	4.907767	3.056744	-1.184316	10.999849
	Equal variances not assumed			1.623	45.104	.056	.112	4.907767	3.023677	-1.181845	10.997379

Table 10: Independent Samples Test on First click

**H6:** By adding a tag stating “Most popular option” (average) consumer purchase satisfaction will increase.

Aligned with previous results, a significant difference in purchase satisfaction is observed between the control and default nudge groups. A one-way ANOVA was performed showcasing a statistically significant difference between the mean values of purchase satisfaction of each group ( $F(2, 112) = 9.280, p < .001$ ) (Table 7). The displayed mean scores for purchase satisfaction are  $M_{\text{Control}} = 5.87$  and  $M_{\text{Social}} = 6.35$  (Table 8). Thus, Hypothesis 6 is accepted. On an additional note, Tukey’s post hoc test indicates a significant difference between the default and social norm nudge groups ( $p < .001$ ) indicating a substantial disparity among them.

Finally, to analyse nudges' impact as moderators on willingness to purchase, which is being considered as a proxy of purchase intention, a one-way ANOVA was conducted. This test demonstrates a statistically significant difference between the mean values of purchase intention of each group ( $F(2, 112) = 3.152, p = .047$ ).

**Table 11:***ANOVA*

Q51\_1\_likel\_actu\_purch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.362	2	2.181	3.152	.047
Within Groups	77.499	112	.692		
Total	81.861	114			

Table 11: One-way ANOVA on Purchase intention

**Table 12:***Descriptives*

Q51\_1\_likel\_actu\_purch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
0	38	4.13	.623	.101	3.93	4.34	3	5
1	40	3.70	1.043	.165	3.37	4.03	1	5
2	37	4.08	.759	.125	3.83	4.33	1	5
Total	115	3.97	.847	.079	3.81	4.12	1	5

Table 12: Descriptives of Purchase intention

The displayed mean scores for purchase intention are MControl= 4.13, MDefault = 3.70 and MSocial = 4.08. Despite this relationship, Levene's test of homogeneity of variances displays a  $p=.024$ , rejecting the null hypothesis of equal variances between groups, which impacts the accuracy of the ANOVA test. Moreover, Tukey's test shows that there is a significant difference between the control and default nudge groups if we expand the significance level to 10% ( $p = .061$ ). Considering all the information presented, it is not possible to conclude if the nudges have a significant impact on purchase intention and if their effects are different among groups.

To better understand the effect of the nudges on purchase intention a linear regression model was developed. This model included the purchase satisfaction variable, as well as demographic variables. The model is significant, if the significance level is extended to 10%, ( $F(7, 107)=2.024, p = .059$ ), it presents an R-squared of 0.117, and the only significant variables were purchase satisfaction ( $p = .034$ ) and gender ( $p = 0.49$ ), having both a positive impact on the dependent variable.

**Table 13:***Model Summary*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.342 <sup>a</sup>	.117	.059	.822

<sup>a</sup> Predictors: (Constant), Q33\_knowledge, Q19\_edu, Q17\_income, Q24 - prev\_purch, Q35\_sati\_after, Q15\_gend, Q18\_age

Table 13: Linear Regression Model I

**Table 14:***ANOVA<sup>a</sup>*

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.573	7	1.368	2.024	.059 <sup>b</sup>
	Residual	72.287	107	.676		
	Total	81.861	114			

<sup>a</sup> Dependent Variable: Q51\_1\_likel\_actu\_purch

<sup>b</sup> Predictors: (Constant), Q33\_knowledge, Q19\_edu, Q17\_income, Q24 - prev\_purch, Q35\_sati\_after, Q15\_gend, Q18\_age

Table 14: One-way ANOVA of Model I

This implies that only purchase satisfaction and gender significantly impact purchase intention. An extra linear regression model was run, adding decision speed as an independent variable, with the introduction of the First click variable, reaching the same results with the exception that the model becomes less statistically significant ( $F(8, 106)=1.763, p = .092$ ).

**Table 15:***Model Summary*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.343 <sup>a</sup>	.117	.051	.826

<sup>a</sup> Predictors: (Constant), Q33\_knowledge, Q19\_edu, Q17\_income, Q24 - prev\_purch, Q35\_sati\_after, Q15\_gend, Q46\_First Click, Q18\_age

Table 15: Linear Regression Model II

**Table 16:**ANOVA<sup>a</sup>

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.614	8	1.202	1.763	.092 <sup>b</sup>
	Residual	72.247	106	.682		
	Total	81.861	114			

<sup>a</sup>. Dependent Variable: Q51\_1\_likel\_actu\_purch<sup>b</sup>. Predictors: (Constant), Q33\_knowledge, Q19\_edu, Q17\_income, Q24 - prev\_purch, Q35\_sati\_after, Q15\_gend, Q46\_First Click, Q18\_age

Table 16: One-way ANOVA of Model II

Additional findings

On a final note, a one-way ANOVA was conducted to understand if there was a significant difference between the time required to make past decisions, reported in the variable Choice speed assessed pre-experiment, and the actual time participants took to make the decision, measured by the First click variable. The mean values for past decision time are  $M_{\text{Control}}=4.58$ ,  $M_{\text{Default}}=4.40$ , and  $M_{\text{Social}}=4.76$ , all values are within the 10-15 minutes interval. Experimental decision time means are  $M_{\text{Control}}=11.29$  seconds,  $M_{\text{Default}}=9.82$  seconds, and  $M_{\text{Social}}=6.38$  seconds.

**Table 17:**

Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Q28_choice_speed	0	38	4.58	1.287	.209	4.16	5.00	2	6
	1	40	4.40	1.464	.231	3.93	4.87	1	6
	2	37	4.76	1.383	.227	4.30	5.22	2	6
	Total	115	4.57	1.377	.128	4.32	4.83	1	6
Q46_First Click	0	38	11.29563	17.683032	2.868567	5.48336	17.10790	.000	81.254
	1	40	9.82253	12.631093	1.997151	5.78291	13.86214	.000	71.001
	2	37	6.38786	5.815164	.956007	4.44899	8.32674	.000	24.145
	Total	115	9.20423	13.073381	1.219099	6.78920	11.61925	.000	81.254

Table 17: Descriptives of Choice speed and First click

The test did not present significant differences in means for either variable:  $p = .528$  and  $p = .251$ , for Choice speed and First click respectively. Thus, significant differences between the groups' decision-making time were not found.

**Table 18:***ANOVA*

		Sum of Squares	df	Mean Square	F	Sig.
Q28_choice_speed	Between Groups	2.448	2	1.224	.642	.528
	Within Groups	213.674	112	1.908		
	Total	216.122	114			
Q46_First Click	Between Groups	474.983	2	237.491	1.399	.251
	Within Groups	19009.132	112	169.724		
	Total	19484.115	114			

Table 18: One-way ANOVA on Choice speed and First click

**Discussion**

The present study focuses on the effect of nudges on online purchase intentions. In particular, the impact of default and social-norm nudges is analysed on purchase satisfaction, decision-making speed, conversion to the product page, and choice presence in the consideration set. The following table presents a summary of the results regarding hypothesis testing.

**Table 19:***Hypothesis Testing Overview*

Hypothesis	Description	Result
<b>H1A</b>	By changing the default order of the options, more customers will consider it in their decision-making.	Not significant
<b>H1B</b>	By changing the default order of the options conversion to the product page will increase.	Rejected
<b>H2</b>	By changing the default order of the options, the speed the consumer decision-making will increase.	Not significant
<b>H3</b>	By changing the default order of the options (average) consumer purchase satisfaction will increase.	Rejected
<b>H4A</b>	By adding a tag stating "Most popular option" to the product, more consumers will consider it in their decision-making.	Not significant
<b>H4B</b>	By adding a tag stating "Most popular option" to the product, conversion to the product page will increase.	Confirmed
<b>H5</b>	By adding a tag stating "Most popular option" consumer decision-making speed will increase.	Not significant
<b>H6</b>	By adding a tag stating "Most popular option" (average) consumer purchase satisfaction will increase.	Confirmed

Table 19: Hypothesis Testing Overview

The three first research questions aimed to understand the effect of the default nudge on the above-mentioned variables. The first question concerns the impact of the default nudge on the decision of the final choice.

*RQ1: Do consumers, knowing the reasoning behind product display ordering, consider buying products that appear in the first position of the presented set?*

The empirical tests performed indicated that participants from the default nudge group considered the nudged option fewer times compared to the ones in the control group, respectively, 29.8% vs 35.1% of participants considered choosing the nudged option. Hence, it would be possible to conclude that the default nudge did not have an impact on decision-making, but since the statistical test did not present significant results, a proper conclusion cannot be reached. Thus, Hypothesis 1A was not supported and further research should be conducted to test the actual impact of the nudge on choice. On a final note, if the significance level of the statistical test is expanded to the 10% level, a different conclusion would be reached, where consumers' decision process is not significantly impacted by the application of the default order nudge.

In line with the first hypothesis, respondents from the treatment group chose option A, the nudged option, fewer times than in the control group: 23.1% versus 30.8%. In contrast, the statistical test displayed a significant relationship between the grouping and choice variables, rejecting Hypothesis 1B. Thus, it is possible to conclude that the default nudge did not impact the participants' decision regarding the final.

The results regarding these two hypotheses, allow us to conclude that in an e-commerce context, the default order nudge does not influence the final choice of technology accessories products. It does not impact the choice itself, and its impact on the decision process behind it should be further investigated. These findings contrast with the literature in terms of the impact of first position in product display on decision-making. Namely, it has been shown that earlier entries gain consideration due to the distribution of cognitive capacity during the choice process ([Xu & Kim, 2008](#)) which is not the case in this study, where the first entry did not present greater consideration. Additionally, differing from [Keller et al. \(2011\)](#) fear of prospective losses associated with not choosing the default option, which can be seen as a recommendation from the retailer, did not outweigh considerations of potential rewards provided by the other options available.

The second research question investigates the impact of the default nudge on decision-making speed: RQ2: *Does the speed of decision-making increase when the default order of presented options is altered so that the first product displayed is the most purchased one?*

To test Hypothesis 2 a one-way ANOVA was performed. It showed that there was not a significant difference between the decision time of the control and default nudge groups ( $M_{\text{Control}} = 11.29$  seconds and  $M_{\text{Default}} = 9.82$  seconds). The Independent-samples t-test corroborated these results. Based on this lack of evidence, results are deemed inconclusive, and Hypothesis 2 is not supported. Thus, due to the lack of significance attained, further research should be conducted to assess the real impact of a default nudge on the decision process regarding technology accessory products in an e-commerce context. Ideally, this scenario should be researched in a study with a bigger sample size and in a better-controlled environment where doubts regarding the experiment can be readily cleared. In terms of connection to existing literature, the applied nudge follows the common practices of nudging, but it did not have the expected impact ([Goswami & Urminsky, 2016](#)). It reduced the need for deliberation, but then again, the decision-making time necessary to complete the decision for the treatment group was not significantly smaller when compared to the control group.

The last question concerns the effect of the default nudge on purchase satisfaction: RQ3: *Is consumers' overall purchase happiness increased when the default order of products display is changed to present the most purchased product in the 1<sup>st</sup> position?*

Similarly, to test Hypothesis 3, a one-way between-subjects ANOVA was conducted to compare the level of purchase satisfaction between the control and default nudge groups. There was a significant impact of the default nudge on purchase satisfaction when compared to the control group. Although purchase satisfaction increased in both groups post-experiment, the increase in satisfaction was smaller for the default nudge group ( $M_{\text{Default}} = 4.80$  and  $M_{\text{Control}} = 5.87$ ). Thus, it can be concluded that the default nudge does not increase purchase satisfaction in the simulated e-commerce scenario of the sale of technology accessories. Moreover, although there is no significant impact to report regarding the subcategory of computer mice perhaps there will be a significant impact of setting default options on consumers' purchase satisfaction for other technology accessories or even other product categories.

In sum, the application of a default nudge in the choice architecture of e-commerce decisions regarding computer mice has no significant impact on the decision process. It does not increase the number of times the nudged option is chosen, but it could have a significant

effect on the consideration set of the final option in the choice process. Also, knowing the reason why the product is displayed in the first position of the ordered set does not affect consumer decisions (RQ 1). Additionally, the tool does not significantly impact purchase satisfaction in the studied consumption context (RQ3), and it is not possible to draw conclusions regarding the impact of the default nudge in decision-making speed for the simulated purchase (RQ2).

The last three questions follow the same structure as the first three ones. The first research question is related to the impact of the social norm nudge on consumers' final choices. The second concerns the impact of the social norm nudge on decision speed and the last analysis is the impact on purchase satisfaction.

*RQ4: Are consumers more willing to consider buying products that show social proof of quality?*

To analyse the effect of the social norm nudge statistical tests were performed showing that respondents from the treatment group chose the nudge option more often than the ones in the control group. Due to the lack of significance of these results, it cannot be concluded that the social norm nudge influences consumers to consider the socially advocated choice more often than the remaining ones and Hypothesis 4A is not supported. Thus, conclusions regarding the influence of the social norm nudge cannot be drawn in the context of the e-commerce sale of technology accessories.

The results regarding the impact of social norm nudges on final choice showed that participants of the treatment group chose the nudged option more often than the remaining ones. A significant difference was detected between the results from the social norm nudge group and the control one where 46.2% of respondents in the first group chose the socially advocated option versus 30.8% of respondents in the control experiment. With this in mind, Hypothesis 4B is confirmed and it is possible to conclude that applying a social norm nudge to the studied context will lead to a higher number of sales of the socially advocated option. In terms of practical implications, this shows that managers could apply social norm nudges in the studied context to improve firms' revenues while maintaining consumer freedom of choice. ([Thaler & Sunstein, 2008](#))

All in all, the results obtained from the testing of the two hypotheses are aligned with the literature in the sense that by changing the visual setup of available options, by adding a tag stating "Most Popular", consumers opt for the nudged product more times ([Goswami &](#)

[Urminsky, 2016](#); [Caraban et al., 2019](#)). Also, it is possible to conclude that the configuration of the set of available products is key in influencing consumers' decisions in line with [Dellaert et al. \(2022\)](#).

*RQ5: Is the speed of decision-making increased when social proof is included in the choice architecture?*

A one-way ANOVA was performed to test Hypothesis 5, as well as an Independent-samples t-test, to confirm the first test's results. The ANOVA test showed that there was not a significant difference between the decision time of the control and social norm nudge groups ( $M_{\text{Control}} = 11.29$  seconds and  $M_{\text{Social}} = 6.38$  seconds). The t-test verified these results, thus, based on the lack of significance attained, further research should be conducted to assess the real impact of a social norm nudge in an e-commerce context. Results are deemed inconclusive, and Hypothesis 5 is considered to not be supported. Like Hypothesis 2, the impact of the social norm nudge should be researched in a study with a larger sample size and in a better-controlled environment to solve any questions regarding the functioning of the platform. In terms of connection to existing literature, the social norm nudge reduced the need for deliberation time, but the decision speed necessary to complete the decision of the treatment group was not significantly smaller when compared to the control group.

*RQ6: Is consumers' purchase satisfaction increased in the presence of social proof?*

To test Hypothesis 6, a one-way between-subjects ANOVA was conducted to compare the level of purchase satisfaction between the control and social norm nudge groups. A significant difference was observed between the effect of the social norm nudge on purchase satisfaction. The mean value of purchase satisfaction of the social norm nudge group was higher than the control group value:  $M_{\text{Social}} = 6.35$  and  $M_{\text{Control}} = 5.87$ . Therefore, it can be concluded that the social norm nudge significantly increases purchase satisfaction in an e-commerce context. This finding is aligned with past literature, namely, it is aligned with the findings of [Talib & Saat \(2017\)](#) and [Caraban et al. \(2019\)](#). The first stated that when consumers explore e-commerce websites, social considerations significantly impact decision processes, which is corroborated by the presented findings. The second highlighted the importance of the visual configuration of the options set, which the findings support. Furthermore, this finding has practical implications for e-commerce retailers. Through the implementation of social norm nudges in choice architecture, retailers can improve the consumer journey on-site, improving overall purchase satisfaction and consequently also improving sales revenues.

In summary, the social norm nudge has a significant impact on choice architecture which leads to an increase in willingness to buy products with social proof of quality. Additionally, the associated process of option consideration should be further studied in the analysed context to understand if there is a significant impact of this nudge on it (RQ4). Likewise, additional research is required to determine the impact of social proof on the time required to make a decision (RQ5). Finally, consumer purchase satisfaction is increased when there is the presence of social proof on the choice architecture of retailers' websites (RQ6).

Lastly, to understand the nudges' impact on purchase intention two tests were performed resulting in non-conclusive results. The first test displayed contradictory results and the second exhibited very little explanatory power regarding nudge impact on purchase intention. The only two components that displayed a significant impact on purchase intention were purchase satisfaction and gender. Both positively impact purchase intention, i.e., the two variables increase consumers' purchase intention in the simulated purchase context. Based on this, it can be stated that, although nudging tools do not directly impact purchasing intentions, nudges affect purchase decisions through their impact on consumption satisfaction and its interaction with consumer gender. To better understand the last relation further research should be developed since conclusions cannot be drawn in this study due to the lack of statistical significance of results related to this variable. In addition, the tested nudges could also be applied to different purchasing contexts to assess if different results are achieved.

These findings are in line with [Talib & Saat \(2017\)](#) who identify a significant impact of legitimacy verification in purchase decisions. The authors emphasize the impact of social cues on consumer behaviour. These findings are sustained by the results presented which showcase the impact of adding social proof on the decision. Moreover, the present paper's findings corroborate the authors' findings regarding the impact of social considerations on online purchasing intentions. Additionally, with the application of the social norm nudge, there is an optimization of the decision-making process in terms of better matching the consumers' wants and the offered product. This connects to [Dellaert et al., 2022](#) findings of focusing visitors' attention on a defined selection of options, which then acknowledges the key importance of the configuration of the offers set. Thus, aligned with this study's findings, the authors recognize the importance of option set configuration which is improved through the application of a social norm nudge, focusing consumers' attention on products that match their wants. This leads to a higher satisfaction associated with the purchase, which then increases purchase intentions.

On a final note, an additional finding regarding awareness of the time required to decide will be analysed. Through the analysis of the actual time required to decide on the study and its comparison to the perceived time respondents considered necessary to choose a substantial difference is found. On average, participants took a few seconds to decide on the experimental part of the survey. This amount of time is considerably smaller compared to the average 10-15 minutes perceived to be necessary to make a similar decision. Thus, we can discuss that people assume they require more time, than they actually need, to choose a product in an online context. Although significant results were not obtained regarding this difference, it would be interesting to study this curious fact in further research.

## **Conclusion and Limitations**

In conclusion, this research studies the impact of nudges application in the choice architecture of e-commerce websites, specifically the impact on purchases of technology accessories. The application of two types of nudges is proposed, default and social norm nudges, and their direct impact on purchase intention is measured as well as their impact on variables that affect it. Namely, the nudges' effects are analysed on purchase satisfaction, decision time, presence in the consideration set, and conversion to the product page. On one hand, results indicate the non-significant impact of the default nudge on the above-mentioned variables or show a lack of evidence to develop conclusions regarding its effect. On the other, significant effects caused by the social norm nudge are reported regarding its effect on purchase satisfaction and the final option chosen, used as a proxy to conversion to the product page. Again, the test performed on data regarding this second nudge also yielded inconclusive results. Therefore, the application of a social norm nudge is an effective method to change consumers' behaviour in simulated e-commerce purchases. Findings, not only suggest a practical means to improve online retailers' sales but also shed insight on the cognitive process of consumer decision-making in the context of online sales of technology accessories. Lastly, the analysis of the direct impact of nudges on purchase intention revealed that there isn't a significant impact on it, but nudges do affect it through changes in purchase satisfaction. Additionally, there is evidence of a relationship between the nudge effect on purchase intention through gender that should be further investigated. On a final note, a curious result was identified in the analysis. There is a significant difference between the perceived time required to decide and the actual time needed to do so. Although statistical significance was not attained in the tests regarding this finding it would be interesting to better understand this difference in future research.

Furthermore, this study bears relevant practical implications in the study of nudge effects on online choice architecture, as well as other underlying concepts. It was shown that by using a social norm nudge in the purchase of a technology accessory consumer purchase satisfaction increased. Hence, through the application of social norm nudges to the choice architecture of e-commerce platforms, managers can improve the consumer journey while maintaining customers' freedom and autonomy of choice. The tool's effect also affects the conversion to buyer rate since, through the improvement of the customer journey, purchase intention increases. Thus, managers could improve both the customer journey and revenues of e-commerce sales of technology products.

Moreover, this study also provides important theoretical implications. First, it extends the current literature on the influence of product display on consumer behaviour, along with new findings regarding the cognitive process that supports online purchases ([Cai & Xu, 2008](#); [Sanak-Kosmowska, 2021](#)). By adding social proof to the choice architecture of online purchase of a computer mouse, consumers display higher levels of purchase satisfaction and tend to choose the socially advocated option more often. Moreover, this paper also contributes to existing literature concerning the design of technology/mediated nudges, in the sense that the choice of the nudged socially advocated option would be based on current data of purchases from the retailer's website ([Caraban et al., 2019](#)). Lastly, this study expands the knowledge regarding nudge application, finding evidence of a new way to deploy a social norm nudge that creates behaviour change ([Caraban et al., 2019](#)).

In terms of limitations, the main limitation of this study is the sample size. Although there were enough answers in each treatment to have a normal distribution of results, the 115 answers did not yield, mostly, statistically significant results. This impaired the ability to draw relevant conclusions and test the proposed hypothesis. Furthermore, another limitation was that most respondents did not understand how they were supposed to choose in the simulated purchase. This is evident when the number of clicks on the experiment page of the survey is analysed. Merely 13% of participants understood how to perform the choice and presented zero clicks on the mentioned page. Moreover, other limitations of the present research are that the sample is solely composed of Portuguese respondents and 41.7% of this falls in the 18-25 age bracket which is not representative of the population. Lastly, one should keep in mind limitations regarding the survey's distribution and time constraints associated with the research being conducted under a master's thesis dissertation.

Finally, in terms of future research, I would recommend that the developed experiments be recreated in a better-controlled environment to mitigate some of the reported limitations, namely problems regarding the functioning of the decision-making. Also, the experiments could be replicated in other product categories, where perhaps the default nudge could have significant effects on the studied variables and the reported social norm nudge impact remained significant. Ideally, the research method to be used for these experiments would be an online A/B testing technique, where consumers from an existing e-commerce retailer could be randomly exposed to one of the two treatments as well as a control group setting. Unfortunately, this was not possible due to the available resources. Thus, in the future, I suggest recreating the experimental design defined in this paper in a real e-commerce context, with a significantly

larger sample, where different results might be reached. To conclude, a study regarding the difference between perceived and actual decision time could be conducted.

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## **Appendices**

### **Appendix 1: Survey**

#### **Block 1:**

Dear participant,

This research is being conducted in the scope of a thesis in the area of Behaviour Change for the Masters in Management with specialisation in Strategic Marketing at Católica Lisbon School of Business and Economics.

The objective of this survey is to understand users' perceptions of online consumption, specifically for the purchase of tech products' accessories.

All data collected will be exclusively used for academic purposes and will be completely anonymous. The data will not be analysed individually, only aggregated data will be used to draw conclusions. Participation is voluntary and may be interrupted at any time during the survey.

Questions with the symbol (\*) are mandatory, and the questionnaire takes on average 5 to 6 minutes to complete.

If you consent to the use of your data for the stated purpose please click the button below.

Thank you for taking the time and for your collaboration!

#### **Block 2:**

Before we start let's clarify some concepts:

Accessories for tech products can be defined as items of equipment that are not essential but can be used with or added to something else in order to make it more efficient, useful, or decorative.

A retailer is a firm that sells products or services directly to consumers. Retailers are not usually the manufacturers of the products sold.

**Q2.1:** Have you previously purchased an accessory for tech products online?

Yes

No

**Q2.2:** How often do you buy accessories for tech products online?

- More than once a week
- Once a week
- Once a month
- Once every 6 months
- Once a year
- Less than once a year
- Never

**Q2.3:** Which accessories for tech products have you bought online?

- Cases (cellphones, tablets, ...)
- Chargers (computer, tablets, ...)
- Computer mouse
- Headphones
- Power bank
- Other:

**Q2.4:** On average, how long do you take to make a choice when buying a tech accessory when you are on the products page?

- Less than 1 minute
- Between 1-5 minutes
- Between 5-10 minutes
- Between 10-15 minutes
- Between 15-20 minutes
- More than 20 minutes

**Q2.5:** How knowledgeable are you regarding the accessory computer mouse?

- I know for what is is used
- I know a little about it
- I have average knowledge
- I know a lot about it
- I am an expert on the matter

**Q2.6:** Which sentences do you associate the most with post-purchase satisfaction?








- Feeling content with the final choice
- Repetition of the purchase
- Feeling satisfied with the decision making process
- Positive evaluation of the consumption journey

**Q2.7:** Taking your definition of post-purchase satisfaction, on average, how satisfied are you with your choices of tech product accessories?

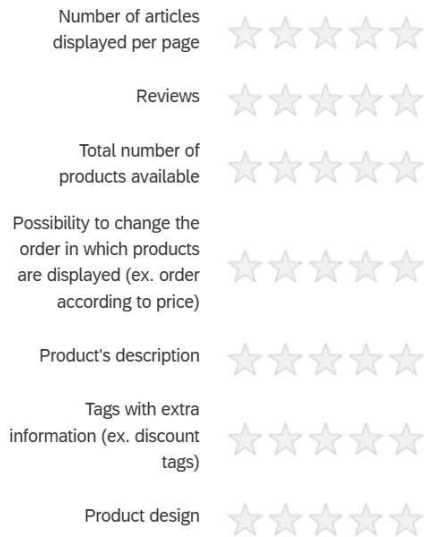
- Very unhappy
- Unhappy
- Slightly unhappy
- Neither happy nor unhappy
- Slightly happy
- Happy
- Very happy

**Block 3: Opinion regarding current websites**

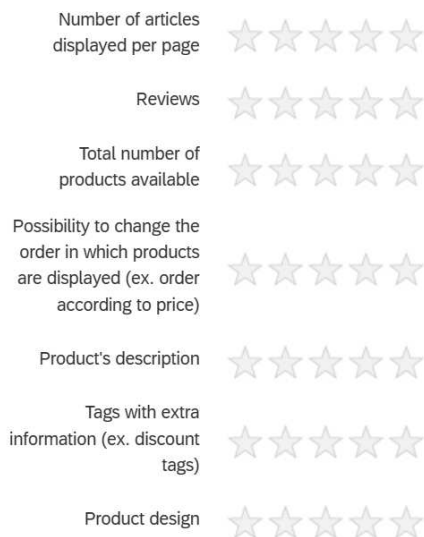
**Q3.1:** Which elements impact your decision the most when buying accessories for tech products? Please evaluate each attribute from 1 (low impact) to 5 (high impact):

Number of articles displayed per page	
Reviews	
Total number of products available	
Possibility to change the order in which products are displayed (ex. order according to price)	
Product's description	
Tags with extra information (ex. discount tags)	
Product design	

**Q3.2:** Which elements make the decision-making easier and improve your overall purchase satisfaction? Please evaluate each attribute from 1 (low impact) to 5 (high impact):



**Q3.3:** Which elements make the purchase decision faster/increase the speed of your decision-making? Please evaluate each attribute from 1 (low impact) to 5 (high impact):



## Block 4: Experiment

### Q4.1: Only for Control group:

In this next part, you will have to make a purchase decision in an e-commerce context. (Note: The next display is not intended to represent any specific website.) You just received a 25€ voucher to spend on a new computer mouse! It can only be used on this purchase and leftover money cannot be used for other purchases. On the next page, you will see a set of 6 products with their respective descriptions. Once you have made your choice please click the button at the bottom of the page.

### Q4.2: Only for Default nudge group:

In this next part, you will have to make a purchase decision in an e-commerce context. (Note: The next display is not intended to represent any specific website.)

You just received a 25€ voucher to spend on a new computer mouse! It can only be used on this purchase and leftover money cannot be used for other purchases.

On the next page, you will see a set of 6 products with their respective descriptions.

You will also see that the set was ordered with respect to the "Relevance" of the products.

The 1st product displayed in this order is the one that was the most purchased in the previous week by customers.

Once you have made your choice please click the button at the bottom of the page.

#### **Q4.3: Only for Social Norm nudge group:**

In this next part, you will have to make a purchase decision in an e-commerce context. (Note: The next display is not intended to represent any specific website.)

You just received a 25€ voucher to spend on a new computer mouse! It can only be used on this purchase and leftover money cannot be used for other purchases.

On the next page, you will see a set of 6 products with their respective descriptions.

You will also see that the 1st product displayed has an additional tag stating "Most Popular". This tag is used to highlight the product that was the most purchased by customers the previous week.

Once you have made your choice please click the button at the bottom of the page.

### **Block 5: Post-experiment**

**Q5.1:** Please select your final choice:

- Mouse A
- Mouse B
- Mouse C
- Mouse D
- Mouse E
- Mouse F

**Q5.2:** Which options did you consider purchasing?

- Mouse A     
  Mouse B     
  Mouse C     
  Mouse D     
  Mouse E     
  Mouse F

**Q5.3:** On a scale from 1 to 5, how likely would it be that you buy your final choice?



**Q5.4:** Which elements impacted your decision the most? Please evaluate each attribute from 1 (low impact) to 5 (high impact):

- Number of articles displayed per page ★★★★★
- Reviews ★★★★★
- Total number of products available ★★★★★
- Possibility to change the order in which products are displayed (ex. order according to price) ★★★★★
- Product's description ★★★★★
- Tags with extra information (ex. discount tags) ★★★★★
- Product design ★★★★★

**Q5.5:** Finally, how satisfied would you be with your choice?

Note: Purchase satisfaction is your post-purchase evaluation and feelings regarding the overall purchase experience in this simulated e-commerce environment.

- Very dissatisfied
- Dissatisfied
- Somewhat dissatisfied
- Neither happy nor unhappy
- Somewhat satisfied
- Satisfied
- Very satisfied

**Block 6: Demographics**

Thank you for your participation! Lastly, please fill the fields below.

**Q6.1:** Please select your age bracket:

- Under 18 years old
- Between 18 and 25 years old
- Between 26 and 32 years old
- Between 33 and 39 years old
- Between 40 and 46 years old
- Between 47 and 53 years old
- Between 54 and 60 years old
- Over 60 years old

**Q6.2:** Please select your gender:

- Male
- Female
- Non-binary / third gender
- Other
- Prefer not to say

**Q6.3:** What is your civil status?

- Single
- Married
- Separated / Divorced
- Widowed

**Q6.4:** What is your highest level of education?

- Middle School
- High School
- Graduate
- Postgraduate
- Masters
- Doctorate
- Other:

**Q6.5:** What is your working status?

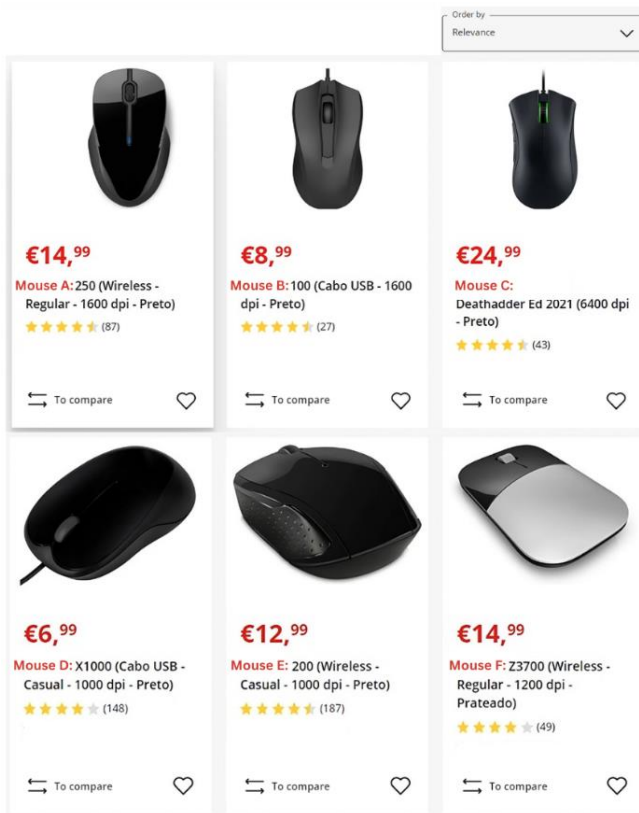
- Full-time employed
- Half-time employed
- Unemployed
- Student
- Retired
- Other:

**Q6.6:** What is your monthly income in Euro (€)?

- Less than 500 €
- Between 500-1000€
- Between 1000-1500€
- Between 1500-2000€
- More than 2000€
- Prefer not to say

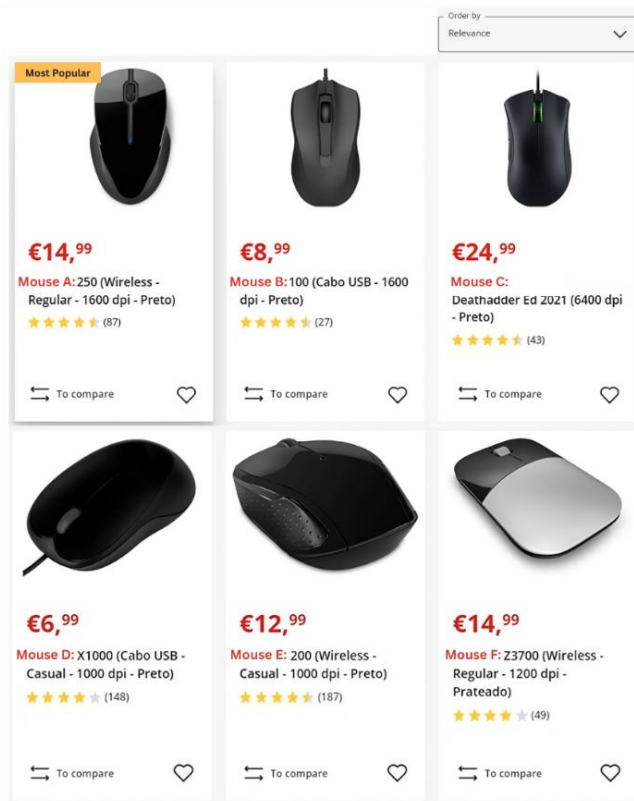
**Appendix 2: Figure 2**

**Figure 2:** Control and Default Nudge visual stimuli



### Appendix 3: Figure 3

**Figure 3:** Social Norm Nudge visual stimuli



### Appendix 4: Control group's experimental introduction

“In this next part, you will have to make a purchase decision in an e-commerce context. (Note: The next display is not intended to represent any specific website.) You just received a 25€ voucher to spend on a new computer mouse! It can only be used on this purchase and leftover money cannot be used for other purchases. On the next page, you will see a set of 6 products with their respective descriptions. Once you have made your choice please click the button at the bottom of the page.”

### Appendix 5: Default Nudge experimental introduction

“In this next part, you will have to make a purchase decision in an e-commerce context. (Note: The next display is not intended to represent any specific website.)

You just received a 25€ voucher to spend on a new computer mouse! It can only be used on this purchase and leftover money cannot be used for other purchases.

On the next page, you will see a set of 6 products with their respective descriptions.

You will also see that the set was ordered with respect to the "Relevance" of the products.

The 1st product displayed in this order is the one that was the most purchased in the previous week by customers.

Once you have made your choice please click the button at the bottom of the page.”

### **Appendix 6: Social Norm Nudge experimental introduction**

“In this next part, you will have to make a purchase decision in an e-commerce context. (Note: The next display is not intended to represent any specific website.)

You just received a 25€ voucher to spend on a new computer mouse! It can only be used on this purchase and leftover money cannot be used for other purchases.

On the next page, you will see a set of 6 products with their respective descriptions.

You will also see that the 1st product displayed has an additional tag stating "Most Popular". This tag is used to highlight the product that was the most purchased by customers the previous week.

Once you have made your choice please click the button at the bottom of the page.”

### **Appendix 7: Sample characteristics**

**Q18\_age**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<18	1	.9	.9	.9
	18-25	48	41.7	41.7	42.6
	26-32	8	7.0	7.0	49.6
	33-39	12	10.4	10.4	60.0
	40-46	17	14.8	14.8	74.8
	47-53	17	14.8	14.8	89.6
	54-60	10	8.7	8.7	98.3
	>60	2	1.7	1.7	100.0
Total	115	100.0	100.0		

**Q15\_gend**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	male	48	41.7	41.7	41.7
	female	66	57.4	57.4	99.1
	prefer not to say	1	.9	.9	100.0
	Total	115	100.0	100.0	

**Q19\_edu**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	middle school	1	.9	.9	.9
	high school	14	12.2	12.2	13.0
	graduate	46	40.0	40.0	53.0
	postgraduate	27	23.5	23.5	76.5
	masters	26	22.6	22.6	99.1
	doctorate	1	.9	.9	100.0
	Total	115	100.0	100.0	

**Q29\_satis\_befo**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very unhappy	4	3.5	3.5	3.5
	Slightly unhappy	1	.9	.9	4.3
	Neither happy nor unhappy	6	5.2	5.2	9.6
	Slightly happy	24	20.9	20.9	30.4
	Happy	71	61.7	61.7	92.2
	Very happy	9	7.8	7.8	100.0
	Total	115	100.0	100.0	

**Q24 - prev\_purch**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	102	88.7	88.7	88.7
	no	13	11.3	11.3	100.0
	Total	115	100.0	100.0	

**Q27 - purch\_repet**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Once a week	1	.9	.9	.9
	Once a month	8	7.0	7.0	7.8
	Once every 6 months	51	44.3	44.3	52.2
	Once a year	25	21.7	21.7	73.9
	Less than once a year	26	22.6	22.6	96.5
	Never	4	3.5	3.5	100.0
	Total	115	100.0	100.0	

**Q28\_choice\_speed**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 1 minute	1	.9	.9	.9
	Between 1-5 minutes	8	7.0	7.0	7.8
	Between 5-10 minutes	21	18.3	18.3	26.1
	Between 10-15 minutes	22	19.1	19.1	45.2
	Between 15-20 minutes	20	17.4	17.4	62.6
	More than 20 minutes	43	37.4	37.4	100.0
	Total	115	100.0	100.0	

**Q33\_knowledge**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I know for what it is used	30	26.1	26.1	26.1
	I know a little about it	23	20.0	20.0	46.1
	I have average knowledge	44	38.3	38.3	84.3
	I know a lot about it	14	12.2	12.2	96.5
	I am an expert on the matter	4	3.5	3.5	100.0
	Total	115	100.0	100.0	

**\$product\_type Frequencies**

prod_type <sup>a</sup>		Responses		Percent of Cases
		N	Percent	
	V06_cases	75	28.4%	65.2%
	V05_chargers	47	17.8%	40.9%
	V04_mouse	35	13.3%	30.4%
	V03_headphones	67	25.4%	58.3%
	V02_powerbank	29	11.0%	25.2%
	V01_other	11	4.2%	9.6%
Total		264	100.0%	229.6%

a. Dichotomy group tabulated at value 1.

**Descriptive Statistics**

	N	Minimum	Mean
Q31_1_attri_gen_no_art	115	1	3.23
Q31_2_attri_gen_revs	115	2	4.41
Q31_3_attri_gen_no_page	115	1	3.38
Q31_4_attri_gen_order	115	1	4.09
Q31_5_attri_gen_descr	115	1	4.29
Q31_6_attri_gen_tag	115	0	3.77
Q31_7_attri_gen_desig	115	0	4.19
Valid N (listwise)	115		

**Descriptive Statistics**

	N	Minimum	Mean
Q38_1_attri_sat_no_art	115	0	3.41
Q38_2_attri_sat_revs	115	2	4.46
Q38_3_attri_sat_no_page	115	1	3.54
Q38_4_attri_sat_order	115	1	4.06
Q38_5_attri_sat_descr	115	2	4.30
Q38_6_attri_sat_tag	115	1	3.70
Q38_7_attri_sat_desig	115	2	4.20
Valid N (listwise)	115		

**Descriptive Statistics**

	N	Minimum	Mean
Q37_1_attri_spe_no_art	115	0	3.40
Q37_2_attri_spe_revs	115	1	4.18
Q37_3_attri_spe_no_page	114	0	3.39
Q37_4_attri_spe_order	114	1	4.09
Q37_5_attri_spe_descr	114	1	4.05
Q37_6_attri_spe_tag	114	0	3.69
Q37_7_attri_spe_desig	113	1	3.91
Valid N (listwise)	113		

**Appendix 8: Results Tables**

**Hypothesis 1 and 4:**

*Crosstab*

Count

		Group			Total
		0	1	2	
V47_Option_A	0	18	23	17	58
	1	20	17	20	57
Total		38	40	37	115

V40\_Option\_A \* Group Crosstabulation

Count

		Group			Total
		0	1	2	
V40_Option_A	0	26	31	19	76
	1	12	9	18	39
Total		38	40	37	115

Hypothesis 2 to 6:

Multiple Comparisons

Tukey HSD

Dependent Variable	(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Q46_First Click	0	1	1.473107	2.951193	.872	-5.53679	8.48300
		2	4.907767	3.008916	.237	-2.23924	12.05477
	1	0	-1.473107	2.951193	.872	-8.48300	5.53679
		2	3.434660	2.971575	.482	-3.62365	10.49297
	2	0	-4.907767	3.008916	.237	-12.05477	2.23924
		1	-3.434660	2.971575	.482	-10.49297	3.62365
Q35_sati_after	0	1	1.068*	.368	.012	.19	1.94
		2	-.483	.375	.405	-1.37	.41
	1	0	-1.068*	.368	.012	-1.94	-.19
		2	-1.551*	.370	<.001	-2.43	-.67
	2	0	.483	.375	.405	-.41	1.37
		1	1.551*	.370	<.001	.67	2.43

\*. The mean difference is significant at the 0.05 level.

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
Q46_First Click	0	38	11.29563	17.683032	2.868567
	1	40	9.82253	12.631093	1.997151

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
Q46_First Click	0	38	11.29563	17.683032	2.868567
	2	37	6.38786	5.815164	.956007

Tests of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Q51_1_likel_actu_purch	Based on Mean	3.842	2	112	.024
	Based on Median	1.722	2	112	.183
	Based on Median and with adjusted df	1.722	2	93.594	.184
	Based on trimmed mean	2.635	2	112	.076

Multiple Comparisons

Dependent Variable: Q51\_1\_likel\_actu\_purch

Tukey HSD

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
0	1	.432	.188	.061	-.02	.88
	2	.050	.192	.963	-.41	.51
1	0	-.432	.188	.061	-.88	.02
	2	-.381	.190	.115	-.83	.07
2	0	-.050	.192	.963	-.51	.41
	1	.381	.190	.115	-.07	.83

Coefficients<sup>a</sup>

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.046	.592		5.149	<.001
	Q35_sati_after	.097	.045	.198	2.146	.034
	Q18_age	.045	.043	.102	1.057	.293
	Q15_gend	.266	.133	.184	1.995	.049
	Q19_edu	-.004	.077	-.005	-.052	.958
	Q17_income	-.011	.051	-.021	-.222	.824
	Q24 - prev_purch	.078	.245	.029	.317	.752
	Q33_knowledge	-.105	.071	-.138	-1.475	.143

<sup>a</sup> Dependent Variable: Q51\_1\_likel\_actu\_purch

Coefficients<sup>a</sup>

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.058	.596		5.130	<.001
	Q35_sati_after	.096	.045	.197	2.121	.036
	Q46_First Click	.001	.006	.023	.244	.808
	Q18_age	.046	.043	.103	1.060	.292
	Q15_gend	.264	.134	.183	1.971	.051
	Q19_edu	-.007	.078	-.009	-.090	.928
	Q17_income	-.011	.051	-.020	-.215	.830
	Q24 - prev_purch	.067	.251	.025	.267	.790
	Q33_knowledge	-.105	.072	-.138	-1.463	.146

<sup>a</sup> Dependent Variable: Q51\_1\_likel\_actu\_purch

Q28\_choice\_speed

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 1 minute	1	.9	.9	.9
	Between 1-5 minutes	8	7.0	7.0	7.8
	Between 5-10 minutes	21	18.3	18.3	26.1
	Between 10-15 minutes	22	19.1	19.1	45.2
	Between 15-20 minutes	20	17.4	17.4	62.6
	More than 20 minutes	43	37.4	37.4	100.0
Total		115	100.0	100.0	

*Tests of Homogeneity of Variances*

		Levene Statistic	df1	df2	Sig.
Q28_choice_speed	Based on Mean	.372	2	112	.690
	Based on Median	.363	2	112	.696
	Based on Median and with adjusted df	.363	2	111.919	.696
	Based on trimmed mean	.348	2	112	.707
Q46_First Chck	Based on Mean	3.850	2	112	.024
	Based on Median	1.631	2	112	.200
	Based on Median and with adjusted df	1.631	2	73.249	.203
	Based on trimmed mean	2.388	2	112	.096