INTERACTIVITY FOR IMPROVING PERCEIVED PRODUCT INNOVATIVENESS

THE IMPACT OF ONLINE PRODUCT PRESENTATION INTERACTIVITY ON PRODUCT INNOVATIVENESS PERCEPTION

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Abstract

The emergence of online entrepreneurship platforms made it possible for entrepreneurs to fund their innovative ideas through financial support from business angels, venture capitalists, and crowds. Nevertheless, technology product development projects are the most difficult to fund on such platforms, with the least funding success and highest unsuccessful dollar value among all categories. One major factor affecting funding success on these platforms is the extent of perceived innovativeness of the presented technology products. The extant literature evinces that product innovativeness perception is influenced not only by novelty but also meaningfulness perception and that innovativeness brings higher funding success when novel projects are also perceived to be meaningful. By drawing on the theory of resonance, this study investigates the impact of interactivity on the extent of perceived innovativeness by creating an impact on resonance, which is proposed to represent all pre-identified aspects of meaningfulness. An online experiment was conducted to empirically validate the proposed research model, and increased interactivity was found to be positively associated with perceived product innovativeness through higher resonance. Theoretically, this study proposes the resonance concept to account for the meaningfulness perception regarding innovative product ideas and demonstrates the positive effect of increased interactivity on perceived innovativeness. For practitioners, the results provide evidence for the positive impact of interactive product presentation on the increased perception of resonance and, thus, innovativeness, which evinces a higher potential for funding success in highly innovative product development projects.

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Chapter 1: Introduction

On online entrepreneurship platforms, many different categories of projects are presented with the aim of getting the required funding. Technology projects represent a category that aims to develop new technology products through funding support from crowdfunding audiences (i.e., potential backers). However, technology projects are the most difficult to fund, recording the least funding success and highest unsuccessful dollar value among all categories ("The Kickstarter Fulfillment Report" 2022). An important factor that affects funding success on these platforms is innovativeness perception of the presented products.[1] The extant literature suggests that product innovativeness perception is influenced not only by product novelty but also by product meaningfulness (in some other studies appropriateness) perception, where meaningfulness refers to the extent to which marketing initiatives are considered valuable to the audience (Andrews and Smith 1996).

Meaningfulness perception is an outcome of the meaning-making process, and meaning-making emerges through the interaction between the audience and the product (McDonnell et al. 2017) which emerges through cognitive congruence and emotional fit during the assessment of the product (Rindova and Petkova 2007). However, the interaction between the presented product and the audience is highly limited and structured on online platforms (Yang et al. 2020). The product innovativeness perception of the audience is driven by non-interactive campaign web pages, with limited opportunity to evaluate meaningfulness. This limitation is important because the extant research also demonstrates

[1] Throughout this thesis, the term "product" refers to "tangible new technology product," which excludes intangible "software-only" products such as video games.

that higher perceived innovativeness brings higher funding success when novel projects are also perceived to be meaningful (Im and Workman 2004; Szymanski et al. 2007).

The extant research demonstrates the positive impact of interactive product presentation on financial outcomes (e.g., Daugherty et al. 2008; Schlosser 2006; Yi et al. 2015). This study extends the literature by investigating the relationship between an interactive online examination of technology products and the product innovativeness perception outcome through higher meaningfulness perception, with the aim to provide a remedy for low technology product funding success on online platforms (Le Pendeven and Schwienbacher 2021; Oo et al. 2019; Szymanski et al. 2007).

1.1. Research Motivation

The emergence of online entrepreneurship platforms has initiated a new era in the funding of new technology, the purpose of which is "to bring creative ideas to life" (Ryu 2019). As of 2020, crowdfunding, one important set of such platforms, has made it possible for entrepreneurs to fund their innovative ideas by leveraging a massive market of $300 billion in funding ("P2P Market Data" 2020). Entrepreneurs seek funding on these platforms for a diverse set of purposes and products, such as video games, novels, or technology products.

Nevertheless, tangible technology products are particularly difficult to fund over the Internet. According to statistics from one of the most popular reward-based crowdfunding platforms, Kickstarter, the technology category, which is comprised of new technology product development projects, has the lowest success rate and highest unsuccessful dollar value among all project categories ("The Kickstarter Fulfillment Report" 2022). According

to Kickstarter, as of May 2022, while the success rate of technology projects was around 21.8%, the average success rate of the remaining 14 project categories was 41.2% when technology projects were excluded. Moreover, the unsuccessful dollar value of technology projects comprised 25% of the cumulative unsuccessful dollar amount, in which unsuccessful dollar value refers to the total amount of pledges to unsuccessfully funded projects due to the pledged amount being lower than the required amount to realize the project. This is dramatic for technology projects because on platforms such as Kickstarter, the funding is "all or nothing," which means that if the pledged amount does not reach the target amount, the entrepreneur receives no funding at all.

The remedy for the low funding success rate of tangible technology products is hidden in the causes. Despite other project categories—namely publishing, music, video games, food and craft, comics, film, and arts—tangible technology products require development of new technology diverging from the existing technology which is riskier to materialize in terms of providing harder-to-understand benefits. Under these circumstances, the extent of the innovativeness of these products[1] in terms of the benefits they provide is the major facilitator of funding, which has to be sufficiently appealing by promising meaningful benefits to motivate the audience (i.e., a potential backer) to ignore the risks involved (Oo et al. 2019).

In its broader form, innovativeness is driven by "newness" (i.e., novelty). A hig her degree of newness is expected to increase experiences of innovativeness and a lower degree of newness is considered to be at the other end of the spectrum (Garcia and Calantone 2002). Whereas particularly for a new product to be perceived as highly innovative, many

scholars argued that not only novelty but also "meaningfulness" (in some studies appropriateness, in some others congruence) are essential (Amabile 1983; de Brentani 1989; Fang 2008; Sethi et al. 2001; Szymanski et al. 2007). Indeed, unless an innovation demonstrates cognitive congruence and emotional fit with an audience, it is perceived as strange, weird, or incomprehensible (Jackson and Messick 1965). When cognitive congruence and emotional fit are achieved, the audience perceives the innovative product as more meaningful and valuable (Andrews and Smith 1996; Rindova and Petkova 2007), which has a strong positive association with perceived product innovativeness (Zhang et al. 2016). Moreover, while innovativeness is positively associated with funding success (Le Pendeven and Schwienbacher 2021; Oo et al. 2019), product innovations that are less meaningful, congruent, and appropriate are more difficult to fund over online entrepreneurship platforms (Chan and Parhankangas 2017) and have lower financial performance (Szymanski et al. 2007). Indeed, some researchers have argued that meaningfulness is more impactful than novelty in terms of new product financial funding performance (Im and Workman 2004). In their meta-analysis, Szymanski et al. (2007) concluded that the positive impact of product innovativeness on financial performance was stronger in studies that accounted for the meaningfulness aspect in their innovativeness definition. In another study, Im and Workman (2004) found that while new product novelty does not have a significant impact on financial performance, new product meaningfulness is strongly positively associated with financial performance.

The challenge in facilitating meaningfulness[2] perception about a highly innovative product lies in its major divergence from the existing technology and products (Chen et al. 2020). Examining a product virtually increases the extent of this challenge even further. Before online entrepreneurship platforms were created, potential investors (i.e., potential backers) could directly experience a new product or its prototype. With the emergence of virtual platforms, more product presentations take place online, reducing opportunities to directly experience new products. Instead of a direct product experience, entrepreneurs provide video pitches and photographs of the product alongside text descriptions. Despite the extensive use of multiple media, online entrepreneurship platforms still provide limited opportunities to evaluate products (Wells et al. 2011). The limits of this experience impact product innovativeness perception. Thus, in this study, I explore the potential impact of online interactivity in new product presentations on perceived product innovativeness through increased meaningfulness to create the potential for higher funding success.

The possible impact of perceived product novelty on product innovativeness perception is beyond the scope of this research study for multiple reasons. One reason is that the extent of perceived product novelty is related to the perceived newness of the new product with respect to the existing or already-adopted products (Wei et al. 2022). In this study, the interactivity of the presentation format of an innovative product was hypothesized

[2] Rindova and Petkova (2007) demonstrated that perceived consumer value (i.e., perceived product meaningfulness (Andrews and Smith 1996)) emerges through cognitive congruence and emotional fit responses. On the other hand, Amabile (1983) and Jackson and Messick (1965) used the term "appropriateness," instead of "meaningfulness," in addition to "novelty" in their product innovativeness conceptualization, in which an appropriate product refers to a meaningful product that also fits into its context by solving a problem. Throughout this thesis, to enhance readability, the term meaningfulness will be used to describe the second influencer of innovativeness perception other than novelty (Figure 2-1).

to have an impact only on perceived meaningfulness, not on the extent of perceived newness (i.e., perceived novelty). Moreover, the impact of novelty on innovativeness perception is vastly elaborated in the literature (e.g., Brockman and Morgan 2003; Garcia and Calantone 2002). Therefore, this study aimed to investigate whether an interactive presentation of an innovative product was positively associated with increased product innovativeness perception through increased perceived meaningfulness.

While the multiple aspects of interaction with product presentations on online platforms have been studied in the context of eCommerce, none of these studies have explored the relationship between product interactivity and product innovativeness perception.

1.2. Research Objectives

Online entrepreneurship platforms present new products through text descriptions, videos, and images. The audience's interaction with the presented product is limited to navigating through the product campaign page, reading the description, and watching videos. Unlike on some eCommerce websites, the audience of these platforms cannot directly control or modify the presented product in an interactive fashion. For simple and routine products, the lack of a realistic product experience may not create a barrier to funding; however, for innovative products, the inability to reduce ambiguity through interaction reduces congruence and investment likelihood (Jahng et al. 2000).

A virtual product experience allows for the movement of a product and the possibility to experience its functionality (Jiang and Benbasat 2004), thereby leading to a more realistic product experience (Daugherty et al. 2008; Klein 2003). Such an experience

increases the ability to visualize the presented product (Escalas 2004; Liu et al. 2019), comprehend it (Daugherty et al. 2008; Suh and Lee 2005), and the probability of getting attached to it (Desmet and Hekkert 2007). Specifically, the opportunity to virtually interact with a product has a strong positive correlation with the congruence perception of the audience of the product being examined (Gabisch 2011). More importantly, the emergence of resonance, which refers to a meaning-making process initiated by congruence, is a process structured by the interaction between the audience (i.e., potential backers) and the presented product (McDonnell et al. 2017). Therefore, a multisensory interaction with an innovative product may facilitate the emergence of meaningfulness and congruence perceptions. Following the product innovativeness literature, which identifies meaningfulness and congruence as major drivers of innovativeness perception alongside novelty, the main objective of this thesis study is to investigate the impact of higher levels of interactivity on product innovativeness perception, a relationship that I hypothesize is mediated by perceived meaningfulness and congruence. Therefore, the first research question of this study is as follows:

RQ1. *How and to what extent does the interactivity of new product presentations on online entrepreneurship platforms influence the perceived innovativeness of such products?*

Congruence and meaningfulness are characterized by cognitive and emotional dimensions (Im et al. 2015; Rindova and Petkova 2007). Almost every product has both hedonic and utilitarian appeal, albeit in different proportions[3] (Batra and Ahtola 1991). The

[3] Throughout this thesis, the term "hedonic product" refers to a product whose hedonic appeal is more dominant than its utilitarian appeal. Similarly, the term "utilitarian product" refers to a product whose utilitarian appeal is more dominant than its hedonic appeal.

hedonic component is related to the *sensations* arising from the product experience (Voss et al. 2003), whereas the utilitarian component focuses on functional attributes and instrumental expectations regarding effectiveness, usefulness, necessity, and practicality (Voss et al. 2003). The extant literature provides evidence of the varying significance of cognitive congruence and emotional fit based on product type. For instance, Kempf (1999) demonstrated that the hedonic and utilitarian appeal of a product moderates the impact of audience–product interaction on the audience's product evaluations. He found that the affective response stemming from the product–audience interaction experience influences the evaluation result of "hedonic" products. A more recent study suggested that evaluating utilitarian products evokes more intense cognitive information processing, whereas affective processing is in place for hedonic products (Melnyk et al. 2012). Therefore, the extent of the hedonic or utilitarian appeal of the product under examination may influence the impact mechanism of interactivity on perceived innovativeness. In light of this finding, it is reasonable to expect that innovativeness perceptions would be contingent on product type, whether hedonic or utilitarian. Thus, the second research question is as follows:

RQ2. *Does product type (hedonic/utilitarian) moderate the relationships between interactivity and the antecedents of perceived new product innovativeness on online entrepreneurship platforms?*

1.3. Outline of the Thesis

The rest of this thesis is organized as follows. Chapter 2 provides a literature review on perceived product innovativeness and the use of interactivity on online platforms. Chapter 3 presents the theoretical background and research model of the study. The research

methodology and experimental design are explained in Chapter 4, while Chapter 5 discusses the data analysis and study results. Finally, Chapter 6 outlines the anticipated theoretical and practical contributions and potential limitations.

Chapter 2: Contextual Background

Section 2.1. of this chapter provides a contextual background on the perceived innovativeness of new products, while Section 2.2. presents an overview of the impact of interactivity on online presentation mediums.

2.1. Perceived Innovativeness

The perceived innovativeness of new products has been extensively researched. In a broad sense, perceived innovativeness refers to the extent of the uniqueness of a product in comparison with its competitors (Sethi and Sethi 2009; Wu et al. 2004), and firms that are successful at developing innovative products generally achieve a competitive advantage (Calantone et al. 2010; Menguc and Auh 2010). Indeed, firms that are perceived to be good at developing innovative products are expected to distinctly address diverse demands and accrue corresponding benefits from this differentiation (Story et al. 2015; Walheiser et al. 2021).

A mostly neglected aspect of the perceived innovativeness concept is the perspective difference between the innovator and audience. An offering that the innovator considers innovative may not be perceived as such by the audience of the product (Boisvert and Khan 2022; Calantone et al. 2006; Im et al. 2015; Lee and Colarelli O'Connor 2003). The extent of innovativeness is generally measured by the degree of "newness" of an

innovation, usually judged by the innovator (Garcia and Calantone 2002). However, from the audience's perspective, novelty is not enough to explain the emergence of the innovativeness perception. A product may be considered highly innovative if it is novel, specifically in a way that is valued by the audience (Fang 2008; Im et al. 2015; Sethi et al. 2001). Called "meaningful novelty" or "meaningful uniqueness," this notion is widely used in the context of marketing.

In line with this perspective, social psychology research on product innovativeness has also argued that innovativeness is not only related to the extent of "novelty" but is also contingent on the "appropriateness" of the product from the perspective of potential customers (Amabile 1983; Jackson and Messick 1965) as a placeholder concept for meaningfulness. In this definition, novelty refers to the extent to which the product differs from existing products, and meaningfulness refers to the extent to which the product is valuable and has the properties required to solve a problem (Amabile 1983; Andrews and Smith 1996; Jackson and Messick 1965). Although novelty would be the first criterion to assess product innovativeness, without the second criterion (i.e., appropriateness), products considered innovative would simply be "strange," "odd," or "bizarre" (Jackson and Messick 1965). The conceptual model of perceived innovativeness based on this literature is shown in Figure 2-1.

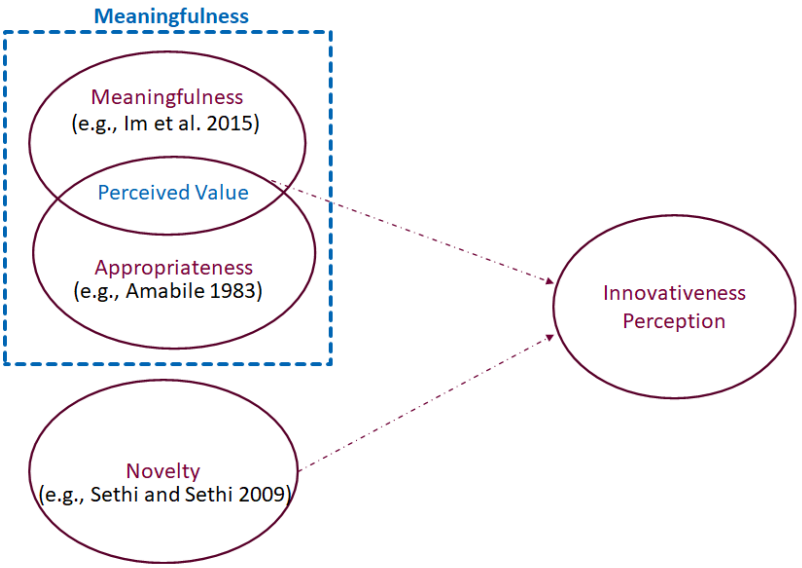

Figure 2-1: Conceptual Model of Perceived Innovativeness

Rindova and Petkova (2007) investigated the antecedents of the perceived value of an innovation and found it to be contingent on the cognitive congruity and emotional fit of the innovation with the preferences of the audience. They stated that value perception, which makes an innovation meaningful for the audience, is constructed by triggering a variety of emotional and cognitive responses based on complex fit and congruence assessments about the innovation. Similar to Jackson and Messick (1965), they noted that when the presented innovation does not fit existing schemas, it will be perceived as strange, weird, or incomprehensible (Rindova and Petkova 2007).

Zhang et al. (2016) also justified the impact of meaningfulness on overall innovativeness perception. Their study on the impact of meaningfulness (i.e., value) on innovativeness perception demonstrates that higher perceived meaningfulness is positively

associated with perceived product innovativeness. Therefore, if the audience does not perceive a product as meaningful, they are unlikely to perceive it as innovative.

The meaningfulness of an innovative product also has an important relationship with financial success. In an empirical study, Im and Workman (2004) found that while the novelty extent of an innovative product does not have a direct effect on its financial performance, meaningfulness has a significant positive association with financial success. This finding is also supported by a meta-analysis. In a comprehensive study, Szymanski et al. (2007) investigated the correlation between product innovativeness and new product performance by meta-analyzing the empirical findings of 95 research studies. In their innovativeness assessment, they found that the correlation between innovativeness and new product performance was stronger in studies that address meaningfulness of the innovation. Lastly, venture capitalists make funding decisions and have been found to favor familiarity by preferring projects with novelty frames used alongside familiarity frames (Pan et al. 2020).

In the scope of online entrepreneurship, the positive impact of the perceived meaningfulness of an innovative product on financial success can be observed through the innovativeness perspective of each study. In one recent study, Chan and Parhankangas (2017) found that radically innovative projects were less successful at reaching their funding goals compared with incrementally innovative projects. By identifying radical and incremental innovativeness as two distinct categories, they differentiated radically innovative projects as more difficult to understand and as providing benefits of lower value; thus, they mostly do not fit with the consumption routines of the audience. Conversely, they

defined incrementally innovative projects as more familiar and beneficial. With these two distinct definitions of radical and incremental innovations, the authors demonstrated that incremental projects, which are more meaningful and congruent from the perspective of the innovativeness literature, were more successful in attracting funding.

In another crowdfunding research study, Oo et al. (2019) found product innovativeness to be positively associated with crowdfunding success, whereby higher innovativeness refers to creating "more novel product ideas with higher use values" (p. 4). As higher value perception has been found to be driven by a combination of cognitive and affective fit assessments (Jahng et al. 2000), Oo and his colleagues' perspective addressed both novelty and congruence as drivers of product innovativeness. From this standpoint, they found a positive relationship between product innovativeness and funding success.

In summary, perceived novelty, specifically from the audience's perspective, is not the sole influencer of product innovativeness. This perception of relatedness, valuableness, and problem-solving capacity, referred to as meaningfulness throughout this thesis, may influence product innovativeness perception, which, as I argue, creates a stronger positive impact on the funding success of new innovative product ideas.

According to McDonnel et al. (2017), in order to facilitate the level of resonance that would lead to higher meaningfulness and inspire a higher capacity for problem-solving and higher congruence between the audience (i.e., potential backers) and the product, there must necessarily be an interaction between the audience and the product as these perceptions emerge through interactions (McDonnell et al. 2017). The literature on interactive product presentation on online platforms, its impact, and consequences is discussed in the next

section. The theory behind the hypothesized impact of interactivity on perceived product innovativeness is elaborated in Chapter 3:.

2.2. Interactivity on Online Platforms

To fulfill the main objective of this study (i.e., to investigate whether higher interactivity in presenting an innovative product enhances perceived innovativeness through increased meaningfulness and congruence perceptions), there is a need to understand how interactivity can create this kind of impact. In this thesis study, interactivity is defined as an aspect of immersion that improves the reality perception of a virtual experience by enhanced user control. The extent to which an online product presentation creates a realistic experience depends on the extent to which the environment has the capability to interactively responding to the "body movements" of users (Peukert et al. 2019; Slater and Wilbur 1997). Although not in use in online entrepreneurship platforms, virtual product experience (VPE) provides a means to interact with a product by controlling the presented content in a 3D setting through a mediating tool, such as a mouse. In comparison with non-interactive mediums, VPE provides a higher degree of user control in different aspects of the product under examination, improves the feeling of direct interaction (Hutchins et al. 1985), and provides a more realistic product experience (Klein 2003).

For multiple reasons, a more realistic and direct-like product experience fosters a stronger cognitive and emotional interaction between the individual and the product. First, human beings perceive the environment through their senses by interacting with it. The way in which the senses are activated and used changes the way a product under examination is perceived. In an experiential study, Gibson (1966) demonstrated how interactive

examination, specifically having physical interaction with three-dimensional (3D) objects, helps improve human perceptual processing. His experiment demonstrated that in comparison with watching the rotating views of an object, having the opportunity to guide the rotation of the object improves the accuracy of comprehension by 25%. This experiment illustrated that guided behavior, which relies on the awareness of the relation between the individual's action and the corresponding sensory response, changes the overall perception associated with the object being explored. The experiment demonstrated how the interactive presentation of a product influences the "product-related perceptions" of the examiner.

Second, information gained through interaction affects not only the perceptual accuracy of an object but also the overall response to it. In support of this claim, Smith (1993) proposed the integrated information response model as a framework to gain a deeper understanding of how individuals use advertorial and trial-based information in assessing a new product. Based on integrated information theory, Smith's model empirically demonstrated that when a product can be evaluated directly, the resultant trial-sourced beliefs of the audience are stronger than their ad-sourced beliefs, and thus, trial-sourced beliefs are expected to dominate the audience's perceptions about the product (Smith 1993). Moreover, his experiment demonstrated that trial-only beliefs are much stronger than advertorial-only beliefs. Thus, in addition to advertorial information, having the opportunity to gain trial information about a product affects the judgmental perceptions of evaluators, with the magnitude of this effect being significant.

Smith's finding is supported by the extant literature in both cognitive and emotional directions. In terms of increased cognition, Mooy and Robben (1998) demonstrated that

directly experiencing a product increases the amount of information acquired and processed by the audience, leading to a "more intensive and multisensory exploration of the product" (p. 319). Direct experience also increases belief confidence and belief strength regarding the product (Mooy and Robben 1998). In a more recent study, Choi and Taylor (2014) demonstrated that providing an opportunity for direct-like product experience in virtual environments facilitates stronger responses in terms of affection and persuasion.

Third, the lack of interactivity on online product presentation mediums attenuates the imagery performance of individuals (Liu et al. 2019), which they need in order to associate themselves with the product through self-referencing (Brown et al. 1986). Having a more realistic experience with an innovative product through VPE increases the perceived congruence between the product and the audience's self (Gabisch 2011), and thus, interactivity can be the key to facilitating higher congruence with innovative products presented online.

Although the impact of higher interactivity on perceived product innovativeness in presenting highly innovative ideas on online platforms has not been investigated in the online funding or online shopping literature, the consequences of higher interactivity on product presentation mediums have been explored. For example, Jiang and Benbasat (2004) investigated the impact of VPE on overall perceived product diagnosticity and perceived flow on online shopping mediums. They demonstrated the positive impact of increased control on both variables. Another study (Jiang and Benbasat 2007) showed that interactivity in online product presentation is positively associated with the perception of compatibility with in-store shopping as well as with the extent of perceived diagnosticity

and shopping enjoyment. In addition to emotional effects such as enjoyment, these studies also justified the significant impact of interactivity on cognitive processes regarding products, such as improved learning, diagnosticity, and understanding.

Klein (2003) also elaborated on the faciliatory effect of product presentation interactivity on the cognitive processes of the users of these mediums. According to her findings, VPE leads to a higher sense of immersion through which the audience's cognitive responses change (Klein 2003). Complementing Klein's research, Li et al. (2001) studied the affective impact of virtual experience. The authors state that virtual experience in an e-Commerce setting represents an affective psychological state, that demonstrates that the VPE also engenders emotional outcomes. In support of this argument, Fortin and Dholakia (2005) evaluated the overall impact of interactivity on advertising effectiveness by measuring the extent of arousal and its consequences created by interactivity on both cognitive and affective attitudes. The study provided an empirical justification for the positive effect of interactivity in both the cognitive and affective dimensions of attitude toward the product.

The impact of interactive online product experience on purchase intention has also been explored in the literature. For example, Schlosser (Schlosser 2006) demonstrated the significant positive effect of product interactivity on both cognitive elaboration and mental imagery, in turn facilitating stronger attitudes and purchase intentions. Daugherty et al. (2008) demonstrated the same positive correlation between the interactivity of virtual experience and purchase intention through increased learning. Yi et al. (2015) investigated the impact of product interaction on the audience's behavior and found that interactivity

leads to higher purchase intention through the mediation of higher engagement and enticement.

Interactive product presentation is positively associated with purchase intention and improves the audience's imagery performance. In one such study investigating the effect of perceived interactivity on mental imagery performance in a more immersive environment, such as augmented reality, Park and Yoo (2020) demonstrated that increase in interactivity increases the mental imagery performance of the users of the medium. In another study, Liu et al. (2019) demonstrated the faciliatory effect of increased interactivity on users' haptic and spatial imagery performance. All these studies evince the impact of interactive product presentations on users' perceptions in a way that resembles a direct experience, which would be expected to affect the product-related perceptions of the users of these interactive platforms.

Chapter 3: Theoretical Development

To answer the research questions outlined in the introductory section of this study, this chapter presents relevant theories in an effort to develop a research model. The research model explores the impact of individuals' virtual interaction with a product of dominantly hedonic or utilitarian appeal on the perceived innovativeness of that product on an online entrepreneurship platform. The theoretical background of the research model is presented in Section 3.1. The proposed theoretical model and associated hypotheses are explained in Section 3.2.

3.1. Theoretical Background

Audiences judge products as innovative depending on their novelty and appropriateness for intended use (Amabile 1983; Fang 2008; Sethi et al. 2001; Szymanski et al. 2007). The appropriateness of a product refers to its meaningfulness and its fit in its context in solving a problem or inspiring a problem by providing a solution (Jackson and Messick 1965). Meaningfulness refers to perceived value driven by cognitive congruence and emotional fit (Andrews and Smith 1996; Rindova and Petkova 2007). In this study, the theory of resonance inspired the grounds to address the concepts of appropriateness, meaningfulness, and congruence that accompany novelty in providing a holistic view of product innovativeness.

In its earlier definitions, the resonance of a product with its audience involved the congruence of the product from the audience's perspective (Benford and Snow 2000). McDonnell et al. (2017) broadened this definition beyond congruence in their theory of resonance by emphasizing the necessity of the meaning-making process for resonance to happen. From their perspective, resonance would be impossible without congruence. However, not all congruent objects resonate with their audience, unless they are also meaningful to the audience. An essential aspect of meaning-making and relevance is defined as the capability to solve a problem in the audience's world. Accordingly, "seeing resonance as an experience emerging when affective and cognitive work provides actors with novel ways to puzzle out, or 'solve,' practical situations" (McDonnell et al. 2017, p. 3). However, that problem does not have to be an existing problem. Rather, "a "solution" often retroactively defines the problem" (McDonnell et al. 2017, p. 4). From this perspective,

resonance may enable the audience to create or identify a problem and inspire solutions to it.

The theory of resonance also clarifies the emergence mechanism of resonance between objects and their audience. According to McDonnell et al. (2017, p.1), "resonance is an emergent process through interactions." They argued that defining resonance simply as congruence misses the significance of the interactions between the product and audience, particularly when the audience is faced with situations that they have never been exposed to or that do not fit in any available schema within their worldview. From this perspective, resonance leads to stronger emotions when people reach novel solutions as a result of non-ritual interactions. Evaluating a highly innovative product on an online platform is an example of such a situation in which the audience is exposed to a product that is most probably one of the first examples of its kind.

According to the reviewed literature, the meaningfulness of an innovative product refers to the extent to which the product is perceived to be valuable by the target audience (Andrews and Smith 1996). As a broader concept than meaningfulness, product appropriateness refers to the extent to which a product is both meaningful and fits in its context by inspiring a solution to a problem or task (Amabile 1983). Emphasizing the same aspects covered by this terminology within the close proximity of meaningfulness, the theory of resonance states that resonance occurs through congruence, where "meaning-making" has to be built in order to inspire a solution to a relevant problem. The theory also sheds light on the emergence of resonance, which occurs by emphasizing the importance of the interaction between the product and its audience. Therefore, in light of the theory of

resonance, in this thesis, I argue that the resonance concept covers the meaningfulness, congruence, and appropriateness concepts by supporting every aspect of these concepts identified within the innovativeness literature. The resonance concept and theory are further elaborated in the following sections.

3.1.1. Resonance

In the marketing domain, the resonance concept is mainly used to analyze why some frames—the organization and packaging of information (Wang 2007)—tend to be more successful than others (e.g., Lempiälä et al., 2019; Pan et al., 2020). In the venture funding domain, resonance is considered a key factor in improving the likelihood of funding success. Given the positive effect of resonance on product introduction success (Eyal 2015), venture capitalists have been found to evaluate entrepreneurial narratives for their capacity to create resonance with the target audience (Pan et al. 2020). Indeed, rhetoric that resonates with the target audience increases the positive attitude toward the new venture and its likelihood of attracting funding (van Werven et al. 2019).

As exemplified above, there is a large body of research on resonance within the framing literature. Moving from there, Giorgi (2017) provided a conceptual model of resonance mainly for analyzing the impact of framing in different contexts. Giorgi's model also has significant implications for analyzing success and failure stories of technological innovations according to the way they are perceived by the audience (Giorgi 2017). For example, analyzing the e-mail acceptance phenomenon through a framing perspective revealed that e-mail technology was not framed by users as an autonomy-diminishing technology and, thus, received a positive reaction, which had, in the end, limited user

autonomy by imposing the necessity of being available to respond anywhere, anytime (Mazmanian et al. 2013). From this perspective, the perceived awkwardness or congruity of an innovation is also an act of framing, where resonance can be the associated concept to analyze the phenomenon.

Resonance is proposed as a bipartite topology composed of cognitive and emotional dimensions. Cognitive resonance stems from the perceived alignment of an item with the audience's understanding, for which familiarity is the main mechanism (Giorgi 2017). Conversely, emotional resonance stems from the "felt" fit of an item with the aspirations or desires of the audience, where the main mechanism is identification (Giorgi 2017; Pratt 2000). In this line of thought, identification refers to a specific type of emotional fit achieved between an item and an audience through the influence of the audience's preferences and desires to facilitate a positive reaction to an offering (Pratt 2000).

A particular technology may resonate with people for cognitive reasons or through emotional attachment (Giorgi 2017). Adapting Giorgi's (2017) perspective to the scope of this research study implies that the audience examining a highly innovative product will frame it according to the cognitive and emotional resonance they have with it, and the extent of resonance is the extent of the cognitive congruence and emotional fit they feel with the product through interaction and sense-making. This perspective provides a comprehensive model to measure the extent of meaningful congruence between a product and an audience's expectations. Adapting Giorgi's (2017) and Pratt's (2000) mechanisms, I measured cognitive resonance by the extent of a participant's perceived familiarity with the presented product. emotional resonance by the perceived fit of the product with the audience's identity

through personal tastes, desires, and preferences as the initial step of identification that could, at best, be achieved in the very first moment of experiencing a highly innovative product. According to this line of reasoning, the more familiar the audience perceives an innovation and the more it fits their tastes, preferences, and desires, the more they would resonate with it.

3.1.2. The Theory of Resonance

Benford and Snow (2000) defined resonance as the congruence between an object and its audience. However, McDonnel et al. (2017) argued that defining resonance simply as congruence weakens its value. They stated that "while resonance may emerge through a process of alignment, not all congruent objects lead to resonance" (McDonnell et al. 2017, p. 2). Therefore, classifying an object as "congruent" or "incongruent" underestimates the significance of the audience–product interaction process that leads to resonance. For an object to resonate with the audience, in addition to congruence, meaning-making ought to be completed through the interaction between the audience and the product (McDonnell et al. 2017). Through the lenses of this theory, allowing the audience to interact with a new product virtually may enhance its chance of resonating with the audience's cognitive and emotional standpoint. Consequently, a higher product innovativeness perception may emerge due to the influential power of meaningfulness and congruence on the extent of perceived value (Rindova and Petkova 2007), which has a significant positive association with product innovativeness perception (Zhang et al. 2016).

As another perspective in resonance research, the resonance marketing hypothesis states that the audience of product presentations today use product-related information,

which is becoming easier to access every single day, to identify the product that meet their wants, desires, needs, and cravings in the best possible way (Clemons et al. 2006). As such, product differentiation is perceived to be valuable when it resonates with the target audience (Clemons et al. 2005). Indeed, differentiation facilitates a positive customer attitude if it is in congruence with customers' cognitive and emotional stance (Rindova and Petkova 2007).

In fact, it is not easy to resonate with a highly innovative product. Such products are more difficult to imagine (Zhao et al. 2012) and self-reference (Dahl and Hoeffler 2004), hindering the ability of the audience to decide whether the product fits their tastes, desires, and preferences. Such a product is also more difficult to comprehend, which attenuates the audience's ability to become familiar with it. Based on the theory of resonance, interaction with such a product may facilitate resonance. Indeed, the advantage of direct experience in overcoming these challenges compared to virtual examination lies in the convenience of interacting with the product in the physical world. Increasing the interaction between the product and the audience (i.e., potential backers) may result in the online product experience further resembling the direct experience and, thus, may increase the chances of a highly innovative product resonating with the potential audience.

As discussed earlier, resonance may be the appropriate concept to represent the perceived meaningfulness, congruence, and appropriateness of a new product. Based on this proposition, resonance may be the key to product differentiation in the form of innovation that is not perceived as strange, weird, or incomprehensible to the extent that it resonates with the target audience. Supporting this argument, Giorgi (2017, p. 730) noted that resonance has the potential to shed light on differing reactions to technology innovations

and may help us understand why a technology might be perceived in different ways by different audiences. In light of this literature and reasoning, I modeled resonance as the mediating variable between interactivity and perceived product innovativeness, which I explain in the following section.

3.2. Research Model and Hypothesis Development

The proposed research model in light of the research objectives, literature, and theory of resonance is depicted in **Figure 3-1**.

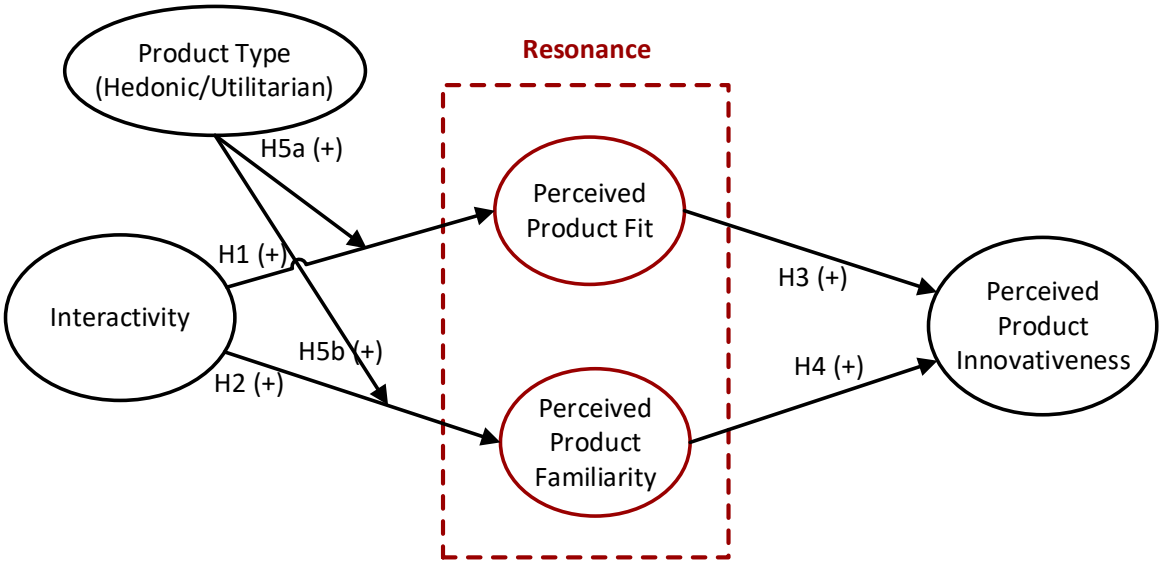

Figure 3-1- Proposed Research Model

The theory of resonance (McDonnell et al. 2017) inspired the mediation of cognitive and emotional resonance between interactivity and perceived product innovativeness. Following Giorgi's (2017) research, resonance is operationalized as a bipartite structure with both cognitive and emotional aspects, with the cognitive aspect being operationalized as perceived familiarity (Giorgi 2017) (i.e., perceived product

familiarity) and the emotional aspect as the perceived fit (Pratt 2000) (i.e., perceived product fit) of the presented product with the audience's (i.e., potential backer's) identity in terms of desires, preferences, and tastes (Hong and Pavlou 2010; Pratt 2000). Each construct in the research model and the associated hypotheses are detailed in the following sub-sections.

3.2.1. Interactivity

Within the scope of this thesis study, interactivity refers to the extent to which the presentation medium enables the users of the medium to control and modify the product so that the online product experience is perceived closer to directly interacting with that product in the physical world. Lombard and Ditton (1997) argued that in a mediated environment, an increased number of sensory channels would increase perceived immersion (Klein 2003). In this sense, while non-interactive virtual environments, such as today's online entrepreneurship platforms, are not expected to create a sense of direct experience, a virtual environment through which the audience of the product can interact with the presented product using mediating devices (e.g., mouse) creates a more realistic product experience. Enabled by such mediums, VPE is an interactive product presentation mode that provides virtual interaction with 3D computer simulations of a product through user control (Jiang and Benbasat 2004). This interaction can only be visual, facilitating the perception of the imagery as real (Schlosser 2006), or both visual and functional, providing a higher level of user control (Jiang and Benbasat 2004) and leading to a less mediated (Klein 2003) and more realistic (Lombard and Ditton 1997) product experience.

3.2.2. Perceived Product Fit

In this research, I define perceived product fit as the extent of the alignment between the presented product and the audience's taste, affective preferences, and desire to possess and use the product (Hong and Pavlou 2014; Pratt 2000). Due to the lack of direct product experience opportunities through online product presentations, fit evaluation in online environments necessitates self-referencing and self-visualization ability. Self-referencing is the activity of processing information by relating it to some personal aspects such as memories, preferences, or visual characteristics (Burnkrant and Unnava 1995). Self-visualization is the activity of imagining the self and the presented product within the same environment, if applicable, while using the product (Dahl and Hoeffler 2004). Research on persuasive communication demonstrates that fit assessment through self-referencing and self-visualization is heavily contingent on related experiences that facilitate the connections between what is presented and the self (Baumgartner et al. 1992; Dahl and Hoeffler 2004). Sharing the same perspective, Keller and McGill (1994) stated that individuals evaluate the desirability of an alternative by imagining the actual experience with it and decide according to their affective response to this experience, which they call imagery heuristic.

However, for a highly innovative product, it is difficult to imagine an experience that relies on relevant past experiences (Dahl and Hoeffler 2004). This is so because, unlike a regular mass-produced product, an innovative product generally presents new contexts for which individuals cannot easily draw on relevant past experiences (Dahl and Hoeffler 2004), which makes it more difficult to mentally simulate the uses of that product (Zhao et al. 2017). In support of this, recent research has demonstrated that the extent of mental

simulation vividness regarding a virtually presented product is contingent on the way individuals interact with that product (Escalas 2004). The decreased likelihood of resemblance between the innovative product and the individual's self-related aspects leads to a tendency to perceive less fit with the product. The challenge of not having prior relevant experience with the product increases the significance of the product presentation format impact on imagery performance and, thus, product fit evaluation. In indicating a potential for remediation, Schlosser (2003) demonstrated that interactive product presentation has a significant positive impact on mental imagery performance. In support of this finding, a recent study by Liu et. al (2019) empirically justified the significant positive impact of having the opportunity to interact with a product in a virtual environment through both spatial and haptic imagery performances.

In line with these findings, the theory of resonance states that interaction with an object (i.e., an innovative product) improves the chance that the audience will resonate with that object by "potentially revising people's desires and imagining of what is possible" (McDonnell et al. 2017, p. 4). Therefore, the theory of resonance posits that interactivity may have the potential to create an impact on people's desires and facilitate their imagination about the possibilities related to the object (i.e., innovative product) being presented. In light of this discussion and based on the abovementioned literature, I hypothesize that the more interactive a product innovation idea is, the more imaginative the audience will be about the aspects of the product that fit their personal desires and taste. Thus:

H1: *Higher interactivity of a product presentation medium is positively associated with perceived product fit.*

3.2.3. Perceived Product Familiarity

In this study, perceived product familiarity refers to the perceived extent of the product-related informedness, experience, and knowledge accumulated by the audience (Alba and Hutchinson 1987; Kennedy et al. 2001). It is challenging to gain familiarity with a highly innovative product due to the newness of its technology and the benefits offered (Chandy and Tellis 1998). Since familiarity perception is a major facilitator of persuasion (Pan et al. 2020), entrepreneurs provide video pitches and photographs of the product beside text descriptions in order to create familiarity and convince the audience (i.e., potential backers).

When the presented product is highly innovative, the ability of the audience to evaluate its physical informational cues on online platforms is very limited in comparison with direct experience (Wells et al. 2011). This situation hinders the process of gaining knowledge about such a product. As a semi-immersive and interactive product presentation technology, VPE gives a closer sense to direct product experience (Daugherty and Biocca 2005; Klein 1998). This direct-like, more realistic experience emerges through a higher perception of informedness (Li et al. 2002), making the user of the platform feel that they have greater product knowledge following the 3D virtual experience in comparison with being exposed to a non-interactive presentation. VPE also leads to a higher perceived trialability of the offered features (Daugherty and Biocca 2005), with improved product learning outcomes (Daugherty et al. 2008; Suh and Lee 2005). As perceived familiarity

refers to the extent of perceived informedness, accumulated experience, and knowledge, it is reasonable to suggest that higher interactivity would help in overcoming the limits of the online presentation mediums by facilitating familiarity through increased informedness, trialability, and learning with a highly innovative product for which no prior experience has been accumulated.

Through the lenses of the theory of resonance, however, familiarity emerges through interaction as a processual cognitive work that inspires practical problem-solving (McDonnell et al. 2017). Therefore, the theory also advocates for the faciliatory effect of interactivity on cognitive resonance. Based on this line of reasoning and the literature, I hypothesize that higher interactivity in presenting a highly innovative product will be positively associated with perceived familiarity with the product:

H2: *Higher interactivity of a product presentation medium is positively associated with perceived product familiarity with the presented product.*

3.2.4. Perceived Product Innovativeness

As discussed in the previous sections, perceived product innovativeness is contingent not only on the extent of novelty but also the extent of the meaningfulness of the product from the perspective of the intended audience (Fang 2008; Sethi et al. 2001). Highly innovative products are mostly novel and significantly different from existing alternatives (Ciganek and Zahedi 2004). However, if the product does not align with the audience's expectations, wants, and needs, then it will be perceived as awkward, odd, or strange (Jackson and Messick 1965). Rindova and Petkova (2007) demonstrated that the perceived

value, and thus meaningfulness (Andrews and Smith 1996), of an innovation emerges through the cognitive congruence and emotional fit of the innovation with its intended audience. Indeed, existing alternatives shape the audience's expectations, and the factors that best align with these expectations would be perceived as more valuable and meaningful. Based on the inspiration gained from the theory of resonance, this thesis study hypothesizes that resonance between the innovative product and the audience addresses the perceived meaningfulness of an innovation from multiple perspectives.

As discussed in Section 3.1.1, resonance is a bipartite concept with cognitive and emotional aspects. In this thesis study, the emotional aspect of resonance is operationalized as the perceived fit of the product with the audience's identity through personal tastes, desires, and preferences (Giorgi 2017; Pratt 2000). The cognitive aspect is operationalized as the perceived familiarity of the product (Giorgi 2017). Therefore, a higher perceived fit would be an indicator of higher emotional resonance, and higher perceived familiarity would be an indicator of higher cognitive resonance, which would inform a better alignment of an innovative product with the emotional and cognitive expectations of the audience. As better cognitive and emotional alignment is positively associated with higher perceived meaningfulness and value (Rindova and Petkova 2007), and higher value anticipation has a strong positive association with the perceived innovativeness of the product (Zhang et al. 2016), higher resonance may be expected to be positively associated with perceived product innovativeness.

From another perspective through the resonance marketing hypothesis, differentiation will be appreciated when it resonates with the audience. As the target

audience's value appreciation leads to higher product innovativeness perception (Zhang et al. 2016), the resonance marketing hypothesis also supports the argument that both higher cognitive resonance and higher emotional resonance will be positively associated with product innovativeness perception. Thus, I hypothesize as follows:

H3: *Higher perceived product fit is positively associated with the perceived innovativeness of that product.*

H4: *Higher perceived familiarity with a product is positively associated with the perceived innovativeness of that product.*

3.2.5. Product Type

According to the nature of aroused audience attitude, a product can be evaluated from a bi-dimensional perspective that accounts for hedonic and utilitarian appeal (Batra and Ahtola 1991). Almost every product has both hedonic and utilitarian appeal, albeit in different proportions[4] (Batra and Ahtola 1991). The hedonic component is related to affective consummatory gratification, such as the appeal of ice cream (Crowley et al. 1992). Such products are appealing as a result of the *sensations* that arise from the product experience, such as fun, enjoyment, and excitement (Voss et al. 2003). Conversely, the utilitarian component focuses on functional attributes and instrumental expectations that may be exemplified by the satisfaction provided by a personal computer (Crowley et al.

[4] Throughout this thesis, the term "hedonic product" refers to a product whose hedonic appeal is more dominant than its utilitarian appeal. Similarly, the term "utilitarian product" refers to a product whose utilitarian appeal is more dominant than its hedonic appeal.

1992). Such products are appealing through their *functions*, which may be evaluated by the extent of their effectiveness, usefulness, necessity, and practicality (Voss et al. 2003).

The proposed research model accounts for both the cognitive and emotional alignment of an innovative product with its audience through interactive presentation mediums. The strength of this relationship may depend on the hedonic/utilitarian appeal of the product under evaluation. One research study demonstrated that the hedonic/utilitarian appeal of a product moderates the relationship between product experience and the emotional response (i.e., arousal) to that experience (Kempf 1999). This finding shows that during product experience, the degree of emotional arousal is higher for a hedonic product than it is for a utilitarian product.

A more recent study has suggested that the target audience engages in more intense cognitive information processing while evaluating a utilitarian product but performs more affective processing for a hedonic product (Melnyk et al. 2012). As cognitive resonance refers to the perceived extent of product-related informedness, experience, and knowledge (i.e., perceived product familiarity), it would be reasonable to hypothesize that higher cognitive processing facilitated by the dominant utilitarian appeal of a product would strengthen the impact mechanism of interactivity on enhancing cognitive resonance (i.e., perceived product familiarity). On the other hand, the impact of interactivity on facilitating emotional resonance (i.e., perceived product fit), which refers to the perceived fit of a product with the audience's desires, tastes, and affective preferences, might be stronger for a product whose appeal mechanism is mostly affection arousal through sensations—that is, a product with hedonic appeal. Stated differently, the impact of interactivity on facilitating

cognitive resonance would be stronger for a product with a higher utilitarian appeal capacity, which would facilitate more intense cognitive processing compared with a product whose utilitarian appeal is lower. Likewise, the impact of interactivity on facilitating emotional resonance would be stronger for a product with a higher hedonic appeal capacity, which would facilitate more intense affective processing in comparison with a product whose hedonic appeal is lower. Thus, I hypothesize as follows:

H5a: *Product type positively moderates the relationship between interactivity and perceived product fit, such that the effect is stronger for a product higher in hedonic appeal than for another lower in hedonic appeal.*

H5b: *Product type positively moderates the relationship between interactivity and perceived product familiarity, such that the effect is stronger for a product higher in utilitarian appeal than for another lower in utilitarian appeal.*

Chapter 4: Research Methodology

To test the research model and proposed hypotheses, I designed a single-factor experiment for two products, one of which was a hedonic-dominant product and the other a utilitarian-dominant product. According to Batra and Ahtota (1991), every product is both hedonic and utilitarian but in different proportions. Given the perceptual, not objective, nature of hedonic and utilitarian dominant appeal and the literature on measuring both hedonic and utilitarian extents of products consistently showing that all products reflect a mixture of both appeals (e.g., Crowley et al. 1992; Voss et al. 2003), the experiment did not include control conditions for non-hedonic or non-utilitarian products.

To test the impact of interactive product presentation on the perceived innovativeness of the products through the mediation of perceived fit and perceived familiarity, as depicted in Figure 1, I had two product presentation web pages, one interactive product presentation and one non-interactive, designed for each product, making four fictitious product presentation web pages in total.

4.1. Design of the Fictitious Product Presentation Web Pages

Following Steuer's (1992, p.80) definition, which states that the extent of interactivity of an environment refers to "the degree to which users of the medium can influence the form or content of the mediated environment," the treatments were manipulated in terms of the participants' ability to interact with the presented products. To test the proposed research model for each product type, I designed two fictitious web pages displaying the same fictitious innovative product with differing interactivity levels. All treatments provided the same depth and breadth of information about the fictitious products to avoid unintended confounding effects that would threaten the validity of the findings, such that

- **Interactive Hedonic (I-H):** Participants were not provided with a 3D interactive model of the product and could interact with the visual presentation of the hedonic product through the use of a mouse and trigger the hedonic features of the product by clicking on the annotation and animation buttons provided.
- **Interactive Utilitarian (I-U):** Participants were provided with a 3D interactive model of the product and could interact with the visual presentation of the utilitarian product

through the use of a mouse and trigger the utilitarian features of the product by clicking on the annotation and animation buttons provided.

- **Non-Interactive Hedonic (N-H):** Participants were not provided with a 3D interactive model of the product but with a video of the visual representation and hedonic features of the product.
- **Non-Interactive Utilitarian (N-U):** Participants were not provided with a 3D interactive model of the product but with a video of the visual representation and utilitarian features of the product.

More specifically, the non-interactive web pages (N-H and N-U) presented a text description, photographs, and a video pitch that provided a rotating view of the product, product functionalities, and product features for the participants to evaluate. On these web pages, the participants did not interact with the products. Instead, they received product-related information through video pitches playing continuously. The video pitches played automatically when they were visible on the participants' displays and paused automatically when they navigated to another part of the page. The video would resume when the participant scrolled back to it on the page to enable the user to see every visual and functional aspect of the product. These web pages provided a medium equivalent to those of current online entrepreneurship platforms, which, in this thesis study, resulted in a significantly low product–participant interactivity perception in the participants' perceived interactivity assessment.

Furthermore, the interactive web pages (I-H and I-U) provided the participants with the same text description and photographs, presenting exactly the same content as the non-

interactive web pages. However, instead of the video, which provided the rotating view of the product, product functionalities, and features on the non-interactive web pages, a 3D interactive model of the product was placed on the interactive web pages. The 3D model provided the participants with the opportunity to visually interact with the presented products by dragging them to rotate 360˚as well as using the mouse to zoom in and zoom. The 3D models also enabled the participants to functionally interact with the products by activating product functionalities and learn product features by clicking on the buttons provided on the model. As the videos were rendered by using the 3D model of the products, the information provided by the video and the 3D model was exactly the same. The difference lay only in the existence, or lack thereof, of the opportunity to interact with the product to receive the same set of information and access the product view.

The ability to visually interact with a product in a 3D space improves the feeling of directness, with a decreased distance between the user's (i.e., audience's) intention to manipulate the product and the medium's response to that input (Hutchins et al. 1985). Furthermore, the impact of visual interactivity on the sense of immersion is closely related to whether the system realistically responds to the incoming signals (Steuer 1992). To minimize potential confounding effects with equally vivid and equal-sized representations of the product, all web pages ensured a smooth experience that was reactive to user input with negligibly small latency (Galletta et al. 2004). In addition, following Degeratu's (2000) finding—that the size of a product under examination on an online platform has an impact on the reaction of online examiners—the initially presented size of the products was kept the same for all four treatments.

To evaluate the moderating effect of product type (hedonic/utilitarian) on the strength of the interactivity–resonance relationships, the treatments included two products, one of which was hedonic and the other utilitarian. Inspired by Hassenzahl et al. (2008), where an mp3 player was designed in two ways (one hedonic and the other utilitarian), I chose the hedonic and utilitarian products from the same category so as to prevent confounding effects due to differences related to product category .

I chose the hedonic and utilitarian products of the experiment to be artificially intelligent. The motivation behind choosing artificially intelligent devices in this experiment was the fact that although smart devices have become more pervasive in the last decade, artificially intelligent devices are still not a native part of our daily lives. Using such devices imposes a multifaceted change initiative with technological, social, and emotional dimensions (Gursoy et al. 2019). I thought that a device that triggered such a multidimensional change in the audience's life would be a good candidate for investigating the impact of interactivity on both cognitive and emotional dimensions. Moreover, an AI product can be designed in various ways to have hedonic or utilitarian appeal for the audience.

The hedonic AI-enabled shoe was designed as a sensitive companion that reacts to how its owner feels throughout the day. Named "Smartie," the AI-enabled shoes are advertised as having a wearable display on their surface. The shoe continuously monitors the metabolism speed of its user as an indicator of the user's mood and changes the animation on its display accordingly. It can sense three moods, which are excited, happy, and sad, and displays by default three pre-chosen surface animations assigned to each of

these moods (see Figure 4-1). The user has the option of uploading any other animation of their choice to display for each of these moods and may display a single animation for all moods if they do not want to reveal their mood to others.

In addition to these three animations, three of the shoe's features are advertised on the shoe model: flexible display, Bluetooth and Wi-Fi connectivity, and wireless charging. Smartie was designed as the hedonic product of this experiment based on the fact that the dominant appeal of these AI-enabled shoes was related to their design and outlook and not the functionality, which may provide a utilitarian benefit to the user.

Figure 4-1- Default Outlook of Smartie (From Left to Right: Excited, Sad, Happy)

The interactive web page presenting Smartie, the hedonic shoe, was designed with a text description, photographs, and an interactive 3D model of the product. The model displays the product and provides the opportunity for the participant to drag and rotate the product, zoom in and out using the mouse wheel, click on each of the three annotation buttons displaying each of the three features (flexible display, connectivity, wireless charging), and click on the animation buttons to play each of the three animations associated with each mood sensed by the shoe. When the participant first enters the page, the product is displayed as a blue sneaker, which starts to display the chosen animation on the wearable

display covering the outer face of the shoe when an animation button is clicked (see Figure 4-2).

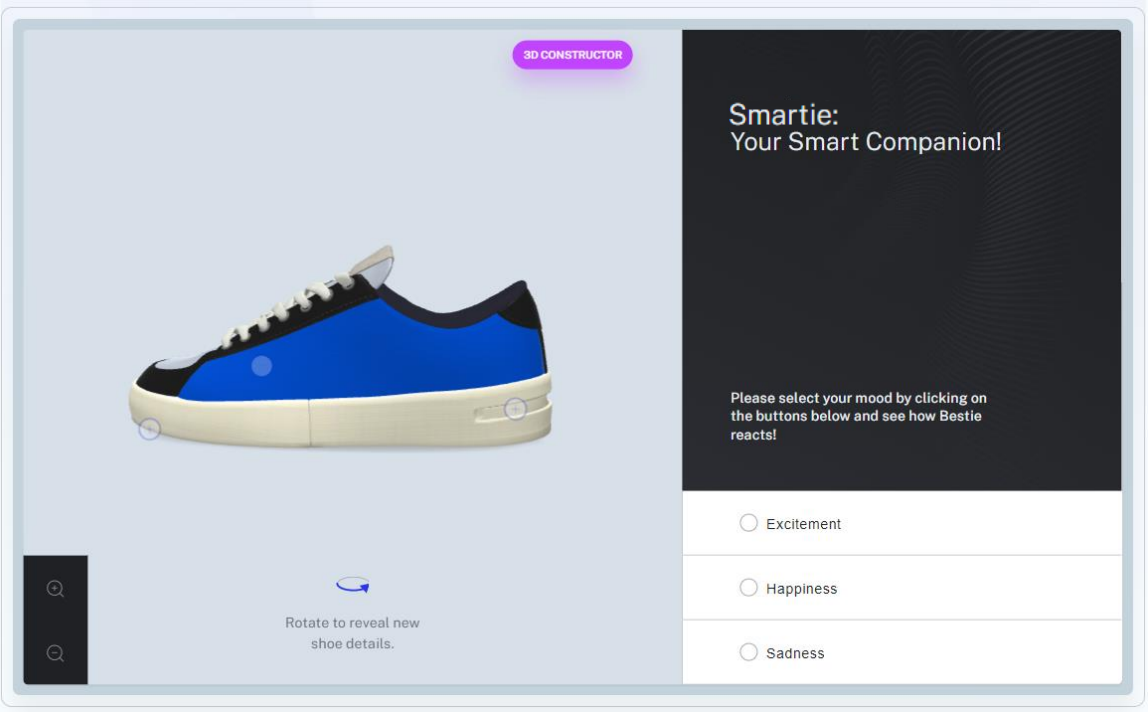

Figure 4-2- Screen Shot of 3D Model on the Hedonic Shoe Interactive Web Page

In this model, the participant may activate the animations by clicking on the animation buttons and view product features by clicking on the annotation buttons. In Figure 4-3, the animation buttons can be seen in the bottom right corner of the window, and the annotation buttons can be seen on the 3D model of the product (transparent circles).

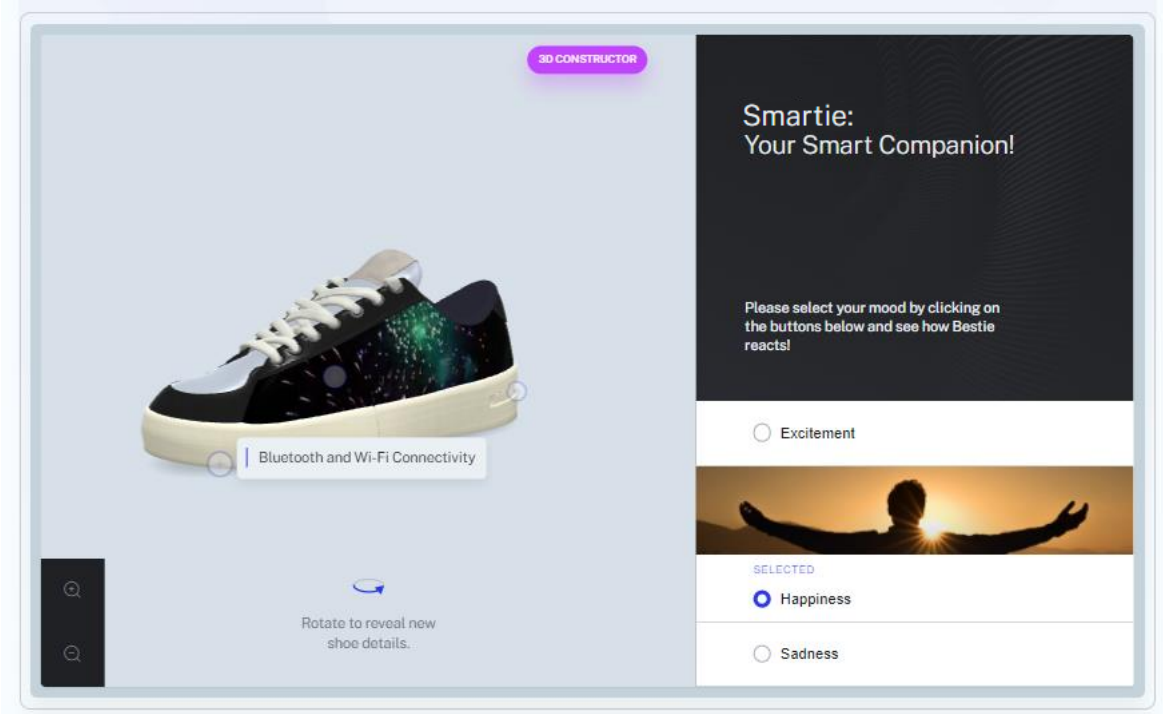

Figure 4-3- Screen Shot of the 3D Model on the Interactive Hedonic Shoe Web Page (The happiness animation button on the right is clicked, and the connectivity annotation button on the shoe model is clicked.)

The non-interactive web page presenting Smartie was designed with the same text description and photographs as the interactive page; however, on the non-interactive page, the 3D interactive model was replaced by a video of the product. The video presents Smartie by displaying a 360° rotating view of the product, then zooming in and out, then displaying the three features mentioned in the previous paragraph one by one (flexible display, wireless charging, and connectivity) (see Figure 4-4), and then displaying the default animations assigned to each of the moods—excitement, sadness, and happiness—one by one without interaction from the participant (see Figure 4-5). The video plays continuously and starts over from the beginning as long as the participant stays on the page and views the video window.

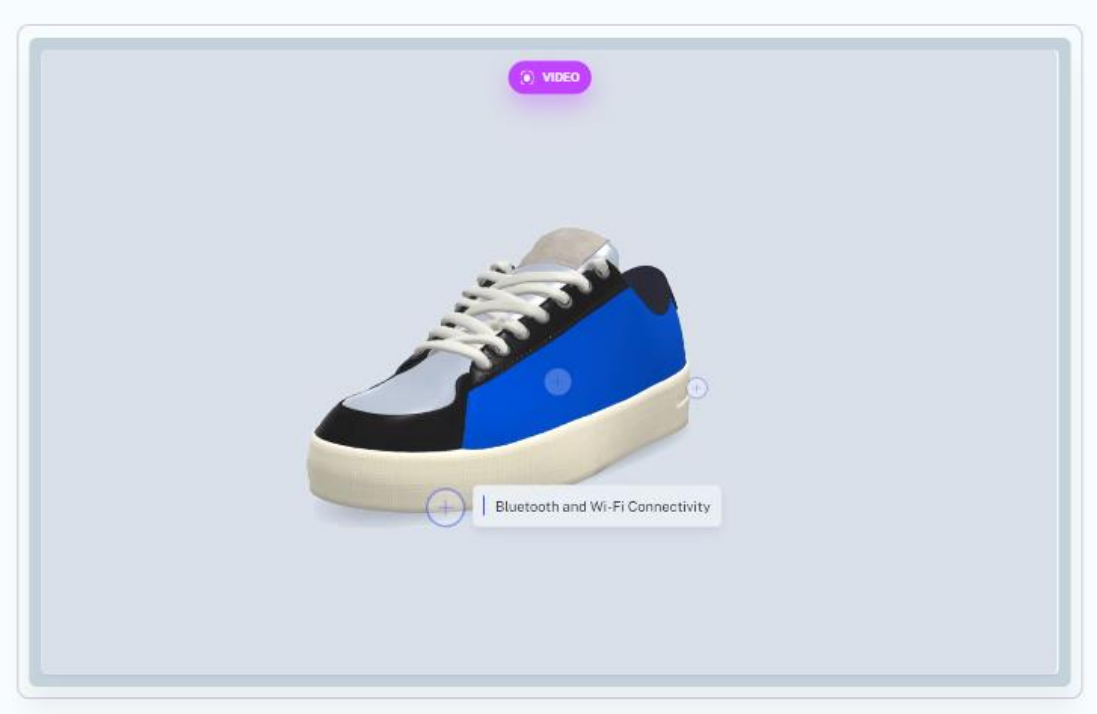

Figure 4-4- Screen Shot of the Video on the Non-Interactive Hedonic Shoe Page (Each of the annotation buttons is activated one by one in the video without participant interaction.)

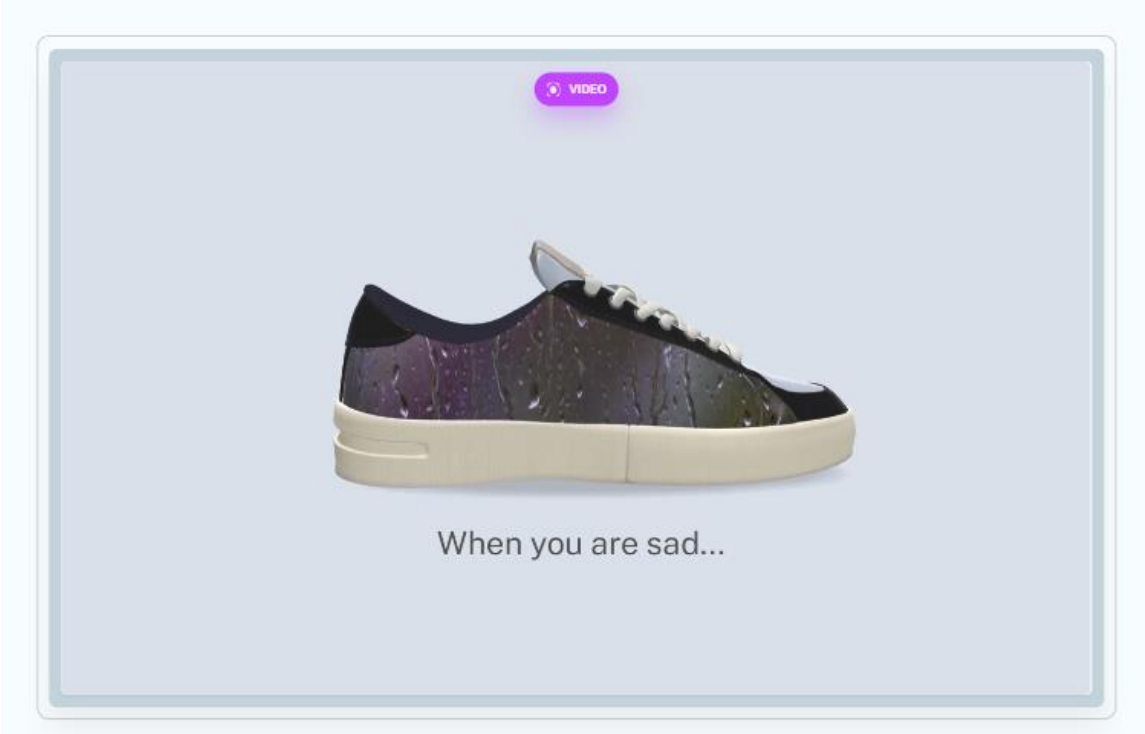

Figure 4-5- Screen Shot of the Video on the Non-Interactive Hedonic Shoe Page while the Video is Displaying the Animation Assigned to Sadness in the Default Configuration

Contrary to Smartie, the utilitarian AI-enabled shoe is a functional companion that corrects any balance or weight distribution issues with users' feet that may be caused by probation or supination (see Figure 4-6). Named "Cushy," these AI-enabled shoes have multiple extremely sensitive sensors inside the sole that measure the weight distribution of the user's feet and dynamically and seamlessly adjust the inclination (slope) of the sole to correct imbalance. The shoe senses any change in the weight distribution, even during daily use, and adjusts itself accordingly. The shoe has the ability to control a large number of microchambers in the sole, each of which is liquid-filled and controlled to incline the fluid toward the side that needs support. This allows the sole to adjust in such a way that it corrects pronation or supination, and each foot is assessed independently, which means that there are three product functionalities: One corrects pronation, another supination, and the last is neutral for healthy feet that do not have a pronation or supination problem.

Figure 4-6- Correction for Pronation and Supination

In addition to these three functionalities, the shoe is designed to have three features: auto-adjusting sole, Bluetooth and Wi-Fi connectivity, and wireless charging. With the appearance of an ordinary blue sneaker, Cushy was designed as the utilitarian product in this experiment based on the fact that the dominant appeal of this AI-enabled shoe was

related to its functionality, not its style or color, which may represent a more hedonic benefit for the user.

The interactive web page presenting Cushy, the utilitarian shoe, was designed with a text description, photographs, and an interactive 3D model of the product. Similar to the hedonic interactive web page, this model displays the product and provides the opportunity to drag and rotate it, to click on each of the three annotation buttons displaying each of the three features (auto-adjusting sole, connectivity, wireless charging), and click on the animation buttons to play each of the three animations (pronation, supination, and neutral) associated with each issue or neutral situation detected by the shoe. When the participant first enters the page, the product is displayed in its neutral form (see Figure 4-7), which starts to display how the auto-adjusting sole reacts based on which animation button is clicked.

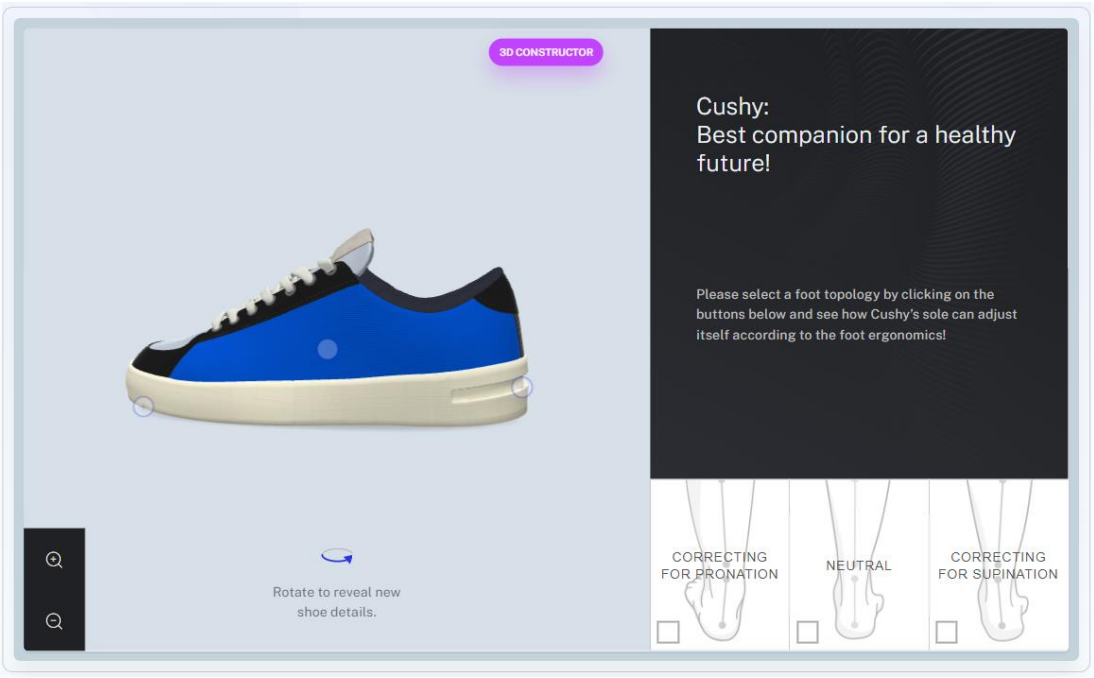

Figure 4-7- Screen Shot of 3D Model on the Utilitarian Shoe Interactive Web Page

In this model, as in the hedonic interactive web page, the participant may activate the animations by clicking on the animation buttons and view product features by clicking on the annotation buttons. The annotation buttons can be seen on the 3D model of the product (transparent circles) in Figure 4-8, and the animation buttons can be seen in the bottom right corner of the window in Figure 4-9.

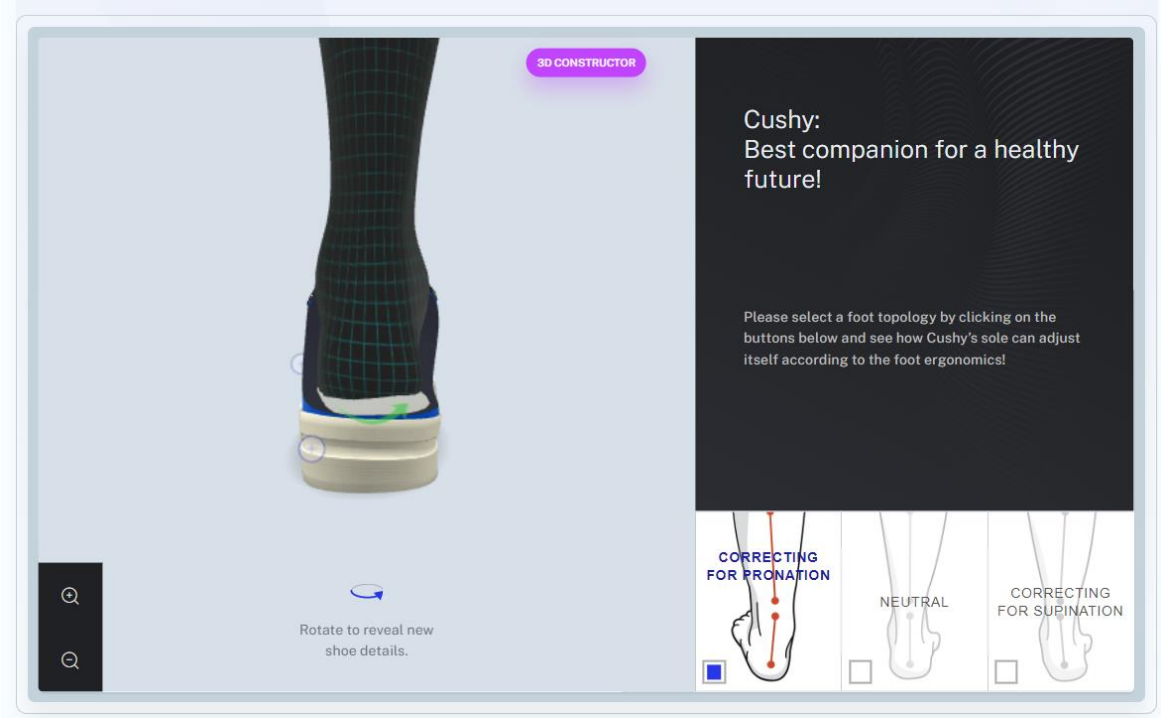

Figure 4-8- Screen Shot of the 3D Model on the Interactive Utilitarian Shoe Web Page (The pronation animation button on the right is clicked.)

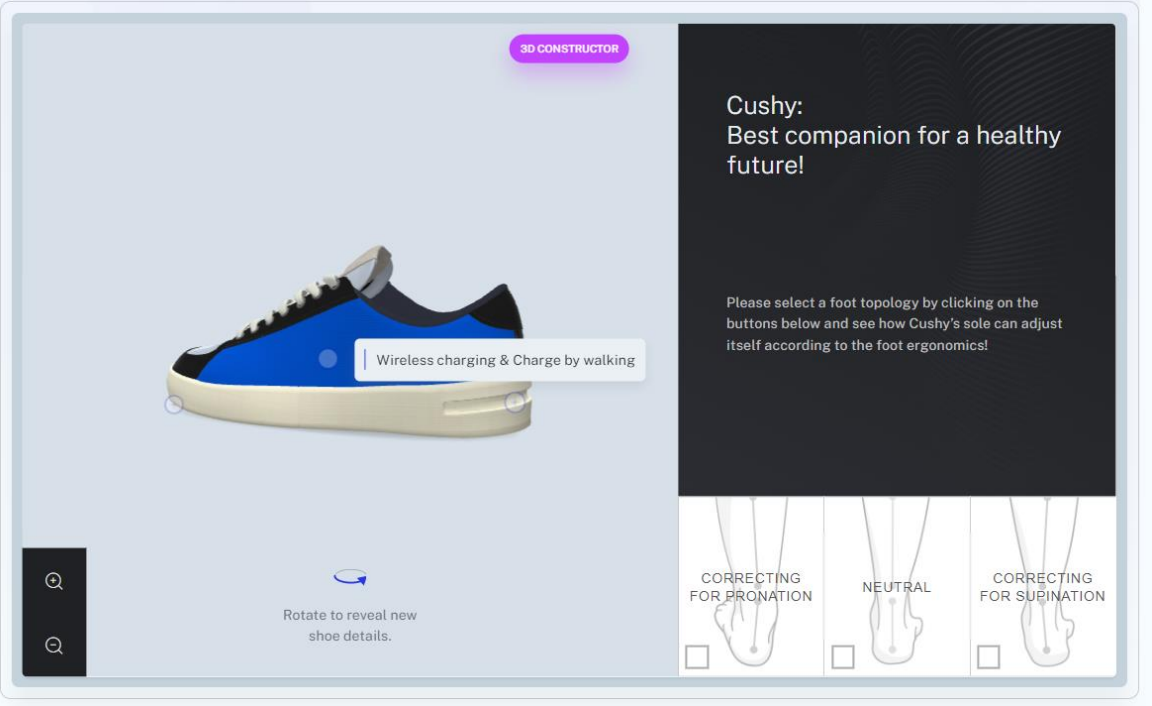

Figure 4-9- Screen Shot of the 3D-Model on the Interactive Utilitarian Shoe Web Page (The wireless charging annotation button on the shoe model is clicked.)

The non-interactive web page presenting Cushy was designed with the same text description and photographs as the interactive page; however, on the non-interactive page, the 3D interactive model was replaced by a video of the product. The video presents Cushy by displaying a 360° rotating view of it, then zooming in and out, then displaying the three features mentioned in the previous paragraph one by one (auto-adjusting sole, wireless charging, and connectivity) (see Figure 4-10), and then displaying the action taken for each of the situations (i.e., pronation, supination, and neutral) by the shoe sole one by one without any interaction from the participant (Figure 4-11). The video plays continuously and starts over from the beginning as long as the participant stays on the page and views the video window.

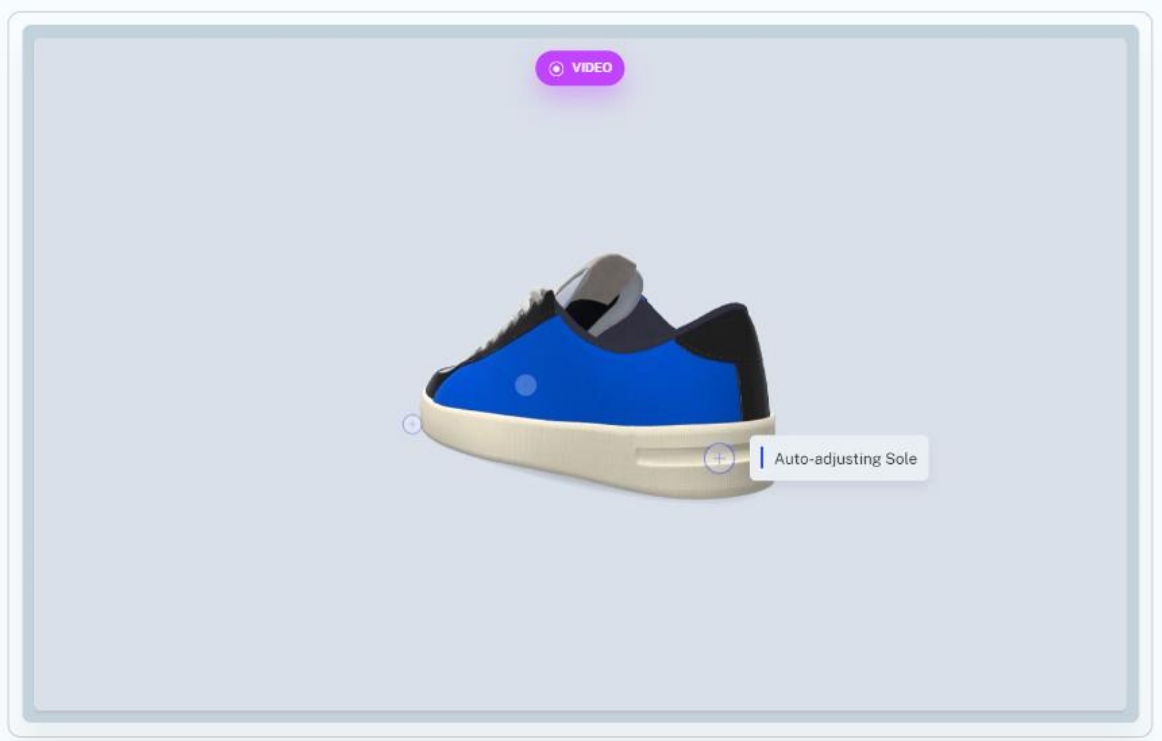

Figure 4-10- Screen Shot of the Video on the Non-Interactive Utilitarian Shoe Page (Each of the annotation buttons is activated one by one in the video without participant interaction.)

Figure 4-11- Screen Shot of the Video on the Non-Interactive Utilitarian Shoe Page while the Video is Displaying the Correction for Supination

Considering the between-subjects nature of the experiment and following the design of the four web pages, two interaction monitoring analytics functions were embedded on the web pages. Without changing the anonymity of the data collection and with the approval of the McMaster Research Ethics Board, the first function monitored the number of clicks each participant made on the 3D model, while the second function monitored the length of time the participants spent on the experimental product web page. These two functions proved to be very useful in terms of identifying the sources of low-quality data and modifying the experimental design accordingly to achieve an acceptable data quality level. How these functions were used is explained in detail in the next section.

4.2. Pilot Study

The participants of this thesis study were sampled among regular people who did not necessarily have prior experience with online entrepreneurship platforms so as to improve the generalizability of the findings.

Following the design of the web pages for each treatment and the embedding of the analytics functions, the first pilot study was conducted to a) confirm the effectiveness of the instructions provided to the participants and b) confirm that the "hedonic" products were perceived as more hedonic and less utilitarian and that the "utilitarian" products were perceived as more utilitarian and less hedonic. This pilot experiment was conducted with 35 participants recruited through a market research firm. After the consent form was displayed and accepted, the participants were informed that their seriousness in following the instructions throughout the experiment was crucial for the validity of the data they provided. Despite this warning, the analytics data revealed that more than 66% of the

participants spent less than 15 seconds on the experimental product web pages and that only a few of those assigned to the interactive web pages actually interacted with these pages. The length of time spent on the page revealed the fact that the participants were not spending enough time on the experiment to enable them to read the information provided on the web pages. Moreover, as the videos on the non-interactive web pages were about 40 seconds long, the time spent on the experiment was not enough for the participants assigned to the non-interactive web pages to watch the videos. These observations formed the basis of the second pilot study.

In the second pilot study, following recommendations by Huang et al. (2012) on the positive impact of warning messages in decreasing careless response rate, the experimental scenario was updated to inform the participants more clearly about the assessments regarding the quality of their participation. In this pilot study, they were also informed that they would be asked a product-related question in the survey before they could actually participate in the experiment. The findings did not differ those of the first pilot. The participants did not follow the instructions of the online experiment, but when they reached the survey at the end of the experiment, they spent enough time on the survey so as not to be marked as a speeder (i.e., careless responder).

Based on the findings of the second pilot study, I embedded specific analytics functions on each product presentation web page (hedonic-interactive, hedonic-non interactive, utilitarian-interactive, utilitarian-non interactive) to ensure that only the participants who spent at least a certain length of time reading the texts on the web page (60 seconds), watched the video on the non-interactive web pages, or clicked on the interactive

model multiple times on the interactive web pages were directed to the survey at the end of the experiment.

The third pilot was conducted with 35 participants across the four treatments. The sample size was not enough to run ANOVA analysis to assess the significance of the differences between treatments. Therefore, I calculated the averages of the Hedonic, Utilitarian and Interactivity measures as a preliminary observation. The sample sizes and arithmetic averages of the Hedonic, Utilitarian and Interactivity measures of each treatment is summarized in Table 4-1, and the averages with respect to each treatment variable are summarized in Table 4-2, and Table 4-3. According to these findings, I had sufficient confidence that the treatments would work.

Table 4-1: Pilot Study Sample Sizes and Treatment Measure Averages

Treatment	Sample Size	Hedonic_{AVG}	Utilitarian_{AVG}	$\text{Interactivity}_{AVG}$
I-H	8	5.8	4.43	3.88
N-H	9	5.56	4.26	1.96
I-U	10	4.92	5.49	3.54
N-U	8	5.4	5.85	2.33

Table 4-2: Pilot Study Interactivity Treatment Measure Averages

Interactivity Treatment	Sample Size	$\text{Interactivity}_{AVG}$
Interactive (I-H & I-U)	18	3.69
Non-Interactive (N-H & N-U)	17	2.13

Table 4-3: Pilot Study Hedonic/Utilitarian Treatment Measure Averages

Hedonic/Utilitarian Treatment	Sample Size	$Hedonic_{AVG}$	$Utilitarian_{AVG}$
Smarty (I-H & N-H)	17	5.67	4.34
Cushy (I-U & N-U)	18	5.13	5.65

4.3. Main Study

Following the ethics approval of the McMaster Research Ethics Board, a market research firm recruited the participants and rewarded them at the end of their participation at the end of their participation according to their own payment policy and agreement with their participants. To improve the generalizability of the findings, the firm sampled the participants among regular people who did not necessarily have prior experience with online entrepreneurship platforms.

Assuming an equal number of participants for each treatment, the sample size for a statistical power of 0.80 to detect a medium effect size ($f = 0.25$) with an α of 0.05 was 180 participants (45 participants for each web page) (Cohen 1988). Considering that online surveys are more susceptible to careless responding in comparison with paper and pencil surveys due to lowered interaction between the administrators and the participants, higher distraction possibility, and lower participant interest (Ward and Pond 2015), I decided to collect a greater number of samples for each treatment. As this was a between-subjects experiment, it was very important to ensure that the participants spent a sufficient amount of time both on examining the experimental product web pages and answering the survey.

Indeed, identifying careless responders through attention-check questions is a method suggested by many scholars (e.g., Meade and Craig 2012; Ward and Meade 2018). Therefore, in addition to the product-related question assessing the participants' attention during the experiment, I inserted an attention-check question toward the end of the survey to assess the participants' attention in responding to the survey questions. The criteria for identifying responses of high quality were as follows:

- The attention-check question was answered correctly in the survey, ensuring a sufficient level of attention in responding to the survey questions.
- At least two of the four features of the presented product were selected correctly in the survey, ensuring a sufficient level of attention in examining the experimental product presentation web page.

The experiment was launched multiple times until a sufficient amount of sample data were collected. As multiple assessments had been applied to extract high-quality data, it was not possible to stop collecting data when the exact sample size was reached for each treatment. As a result of the last launch, the total number of sufficient quality data had been 64 for the treatments I-H and N-U and 65 for the other treatments (N-H, I-U), for a total of 258 participants. As the minimum target sample size for each treatment (45) was exceeded for all treatments, all valid data were used in the data analysis.

4.4. Experimental Procedure

The participants were randomly assigned to one of the four treatments.

The participants progressed through the experiment as follows.

1. The participants were assigned to one of the four treatments.

2. The participants were first presented with the consent page, which informed them about the study (Appendix A). Those who agreed to participate in the study were directed to the corresponding Experimental Scenario web page.

3. The experimental scenario web page informed the participants about what they were expected to do in the upcoming experimental product presentation web page (Appendix B).

4. Once the participants had read the scenario page and clicked "Next," one of the four experimental product presentation web pages was displayed.

   a. The participants in the first treatment (I-H) were directed to the "Smartie" interactive web page (Appendix C).

   b. The participants in the second treatment (I-U) were directed to the "Cushy" interactive web page (Appendix E).

   c. The participants in the third treatment (N-H) were directed to the "Smartie" non-interactive web page (Appendix D).

   d. The participants in the fourth treatment (N-U) were directed to the "Cushy" non-interactive web page (Appendix F).

5. As the participants navigated their assigned experimental product presentation web page, the total amount of time spent on the page and the total number of clicks made on the page were collected. The collected data were used to assess the sufficiency of the participation of each participant. The criteria were as follows:

   a. Spending at least one minute on the assigned experimental product presentation web page.

b. Only in interactive treatments (I-H and I-U), clicking on the 3D interactive model at least four times.

6. Once a participant completed their examination and clicked the "Next" button at the bottom of the experimental product presentation web page,

a. The participant was directed to the survey web page if they were in one of the non-interactive treatments (N-H and N-U) and spent at least 1 minute on their experimental product presentation web page.

b. The participant was directed to the survey web page if they were in one of the interactive treatments (I-H and I-U), spent at least one minute on their experimental product presentation web page, and clicked at least four times on the 3D interactive model. (Participants who followed the instructions given right above the interactive models finished their examination with at least 7 mouse clicks.)

7. Upon completion of the survey, the participants were directed to the portal of the market research firm.

4.5. Measures

To ensure content validity, the constructs were measured using established item scales. Interactivity perception was measured using the three-item perceived interactivity scale by Yi et al. (2015). Perceived product fit scale was adapted from Hong and Pavlou's (2014) five-item perceived product fit uncertainty scale. In its original form, the scale identifies the indicators of product fit and probes the extent to which the participant is certain about the product's fulfillment of each product fit indicator. I adapted the items to directly

ask the extent to which the product fulfills each product fit indicator instead of asking about the uncertainty in fulfilling each indicator (e.g., "I was certain that the product would match my tastes" became "The product matches my tastes"; "I was sure the product would fit my preference" became "The product fits my preference"). Perceived product familiarity was measured using the three-item product familiarity scale by Kennedy et al. (2001). Perceived product innovativeness was adapted from a five-item scale by Gatignon et al. (2002). Lastly, the perceived hedonic dominancy of Smartie and the perceived utilitarian dominancy of Cushy were measured using the hedonic/utilitarian scale by Voss et al. (2003). For all the constructs, the previous studies are used as the basis to determine the scale. Interactivity is measured using 5-point scale, and the other variables are measured using 7-point scale. Using different point scales is suggested as a remedy for common method bias (Jordan and Troth 2020). A list of the measurement items is presented in Appendix G.

4.6. Model Validation

AMOS covariance-based structural equation modelling (SEM) was used to validate the proposed research model. SEM enables the researcher to discover relationships among multiple latent variables by reducing the error in the research model (Hair Jr. et al. 2016). Moreover, the covariance model allows the optimization of correlations among the constructs of the model simultaneously (Bagozzi and Yi 2012; Hair Jr. et al. 2014), making this method a better option to analyze covariance-based data.

I evaluated the research model fit by conducting measurement model fit assessment and structural model fit assessment processes using the IBM SPSS 28, and IBM SPSS AMOS 28 statistical software tools. A detailed analysis of the data and research model is

provided in Chapter 5. The tests conducted for the measurement model are summarized in Table 4-4, and the tests conducted for the structural model are summarized in Table 4-5.

Table 4-4: Summary of Test for the Measurement Model Fit Assessments

Analysis	Test	Note
Item Reliability	Item loadings	▪ Acceptance criterion: Value > 0.50 (Gefen et al. 2000)
Construct Reliability	Cronbach's alpha	▪ Acceptance criterion: Value > 0.70 (Cronbach 1951)
	Composite reliability	▪ Acceptance criterion: Value > 0.60 (Bernstein and Nunnally 1994)
Convergent Validity	CFA	▪ Acceptance criteria: GFI > .90, NFI > .90, AGFI > .80 (or >.90). In addition, item loadings should be above .707 (Gefen et al. 2000)
Discriminant Validity	AVE vs. squared correlations	▪ Acceptance criterion: The square root of the AVE of the construct must be greater than the correlation between that construct and any other construct in the model (Barclay et al. 1995; Fornell and Larcker 1981)
Multicollinearity	Bivariate correlations	▪ Acceptance criterion: bivariate correlations should be less than .80 (Meyers et al. 2006)
	VIF and tolerance values	▪ Acceptance criteria: Tolerance values should be greater than .10, and VIF values should be less than 10.

Table 4-5: Summary of Test for the Structural Model Fit Assessments

Test	Calculation	Note
Goodness of Fit	Absolute Fit	▪ Acceptance criteria: insignificant χ^2, RMSEA > .05, SRMR < .05
	Comparative Fit	▪ Acceptance criteria: NFI > .95, TLI > .97, GFI > .95, CFI > .97

Path coefficients, their signs, and significance	Obtained from IBM SPSS AMOS, version 28	The coefficients and significance of the paths were evaluated through bootstrapping
R^2 values of endogenous variables	Obtained from IBM SPSS AMOS, version 28	R^2 values of the endogenous variables should be at least .10 (Falk and Miller 1992)

Following the measurement and structural model fit assessments, the following post-hoc analyses were conducted to assess the significance of the manipulations among the treatments.

1. ANOVA analysis was conducted to verify the significance of the interactivity manipulation between the interactive (I-H and I-U) and non-interactive (N-H and N-U) treatments.
2. ANOVA analysis was conducted to verify the significance of the hedonic/utilitarian manipulation between the hedonic-dominant (I-H and N-H) and the utilitarian-dominant (I-U and N-U) treatments.
3. The effect of the control variables on the dependent variables was examined.
4. The interactivity plots for the moderating effect of hedonic/utilitarian product appeal were examined to analyze whether they had a significant impact on the hypothesized relationships between interactivity and resonance.

Chapter 5: Data Analysis and Results

5.1. Data Screening

Following the data collection, as detailed in Section 4.3, I conducted a series of data screening assessments on the resulting data set to verify the validity and accuracy of the measurement instruments, analyses, and results using IBM SPSS Statistics, version 28.

5.1.1. Outliers and Missing Values

Outliers may threaten the accuracy of statistical findings when they cause the sample to deviate from the target population (Osborne and Overbay 2004). Outliers may be observed on a single variable (univariate) or group of variables (multivariate) (Meyers et al. 2006). First, I created the composite score of each variable (i.e., construct) by calculating the mean of the variable's individual item indicators. I drew box plots of each composite score using the IBM SPSS Statistics tool, version 28. Following Meyers et al. (2006), I identified individual cases outside 1.5 times the inter-quartile range (IQR) as mild outliers and those outside 3 times the inter-quartile range (IQR) as extreme outliers. Overall, a total of 14 cases were identified as being outside the mild outlier fences. Among the identified cases, ID 99 was an extreme outlier in the perceived familiarity construct, and among the remaining cases, ID 239, ID 61, and ID 91 were mild outliers in multiple constructs and were removed from the data set.

In addition to the univariate outlier analysis, I examined the Mahalanobis distance statistics to identify the multivariate outliers (Meyers et al. 2006). In this examination, the Mahalanobis distance was calculated for each case and compared with the chi-square

distribution based on the p-value of .001. In this case, an individual case would be considered a multivariate outlier if its Mahalanobis distance was above .001. The results of this analysis indicated that the only multivariate outlier in the data set was ID 99, which was identified as an extreme univariate outlier. As a result of these two analyses, 4 outliers were removed from the data set (ID 99, ID 239, ID 61, and ID 91).

Following the univariate outlier analysis, I conducted a missing value analysis on the final data set. As none of the constructs had more than 2% missing values, I removed no additional data. Based on the fact that all the latent variables were measured using ordinal (not continuous) values, I replaced the missing item values with their median values within the data set (Acuña and Rodriguez 2004).

5.1.2. Normality Analysis

Covariance-based SEM assumes the data to be normally distributed (Jr et al. 2017). I conducted Kolmogorov-Smirnov and Shapiro-Wilk tests to check the validity of this assumption. Although both test results indicated that the data collected for all the items were non-normally distributed, the histograms demonstrated skewed normal-like distributions for most of the items. Based on this observation, the kurtosis and skewness of each item were assessed to identify whether all the scales fell inside the range of -1 to +1, which is considered an acceptable range for normality assessments (Hair et al. 2019). Based on the verification that the kurtosis and skewness of each item was within the acceptable range, and research stating that some non-normality in individual items does not necessarily threaten multivariate normality (Gorsuch 1983), I decided to include all the items for further analysis.

5.2. Demographics

According to the participant responses, out of 258 participants, 129 were male, and 129 were female. The participants were aged 18 or older. Their age ranges and the number of participants in each range are given in Table 5-1.

Table 5-1: Age Distribution of Participants

Age Range	Frequency	Percentage
18–35	42	16.3%
35–65	95	44.4%
65+	121	39.3%

In addition to questions of gender and age, the participants were asked to indicate their highest levels of education and experience on online entrepreneurship platforms. The education level statistics indicate that 26.7% of the participants had a high school diploma, 41.1% had a bachelor's degree, 24.4% had a master's degree, 5.8% had a doctoral degree, and 1.9% preferred not to answer the question, as shown in Table 5-2.

Table 5-2 Education Level of Participants

Variable	Category	Frequency	Percentage
Education	High school diploma	69	26.7%
	Bachelor's degree	106	41.1%
	Master's degree	63	24.4%
	Doctoral degree	15	5.8%
	Prefer not to answer	5	1.9%

The participants were also asked about their level of experience using online entrepreneurship platforms. According to their responses, 32.9% of them were not experienced on such platforms at all, 17.8% were somewhat inexperienced, 11.2% were

neither experienced nor inexperienced, 30.2% were somewhat experienced, and 7.8% were very experienced (see Table 5-3).

Table 5-3 Experience Level of Participants on Online Entrepreneurship Platforms

Variable	Category	Frequency	Percentage
Experience	Not experienced at all	85	32.9%
	Somewhat inexperienced	46	17.8%
	Neither experienced nor inexperienced	29	11.2%
	Somewhat experienced	78	30.2%
	Very experienced	20	7.8%

5.3. Manipulation Check

The independent variable in this study was the level of interactivity in virtually experiencing a product on a new product presentation web page. The interactive treatments (I-H and I-U) provided the opportunity to directly manipulate the presented products through visual and functional control, and the non-interactive treatments displayed the same information without any interaction between the participants and the product. The difference between the perceived interactivity levels of these two treatment groups was tested using analysis of variance (ANOVA) and assessing Cohen's D value to check whether the manipulation was successful. The ANOVA results depicted in Table 5-4 demonstrate that the participants perceived the interactivity level of the interactive web pages as significantly higher than that of the non-interactive web pages. The Cohen's D value of 0.74 supports the large effect size of the manipulation. Therefore, the interactivity manipulation was successful.

Table 5-4: One-Way ANOVA Analysis for Interactivity Manipulation Check

Level of Interactivity	Mean	Std. Deviation	Std. Error	95% Confidence Interval		ANOVA			
				Lower Bound	Upper Bound	Sum of Squares	Mean Square	F	Sig.
Interactive (I-H & I-U)	3.73	.83	.07	3.59	3.88	33.04	33.04	34.58	< .001
Non-Interactive (N-H & N-U)	3.01	1.11	.10	2.82	3.21				

Testing for the hypothesized moderating effect of the hedonic/utilitarian dominancy of the presented product required another manipulation; consequently, the hedonic product Smartie and the utilitarian product Cushy were designed. The significance of the difference between the perceived hedonic appeal of Smartie and Cushy was tested using ANOVA and assessing Cohen's D value to check whether the manipulation was successful. The ANOVA results depicted in Table 5-5 demonstrate that the perceived hedonic appeal of Smartie was significantly higher than that of Cushy. The Cohen's D value of 0.27 supports the medium effect size of the manipulation. Therefore, the hedonic appeal manipulation was successful.

Table 5-5: One-Way ANOVA Analysis for Hedonic Appeal Manipulation Check

Hedonic Appeal	Mean	Std. Deviation	Std. Error	95% Confidence Interval		ANOVA			
				Lower Bound	Upper Bound	Sum of Squares	Mean Square	F	Sig.
Smartie (I-H & N-H)	5.48	1.42	.13	5.23	5.73	8.78	8.78	4.74	.03
Cushy (I-U & N-U)	5.11	1.29	.11	4.89	5.34				

The significance of the difference between the perceived utilitarian appeal of Smartie and Cushy was also tested using ANOVA and assessing Cohen's D value. The

ANOVA results depicted in Table 5-6 confirm the expectations by demonstrating that the perceived utilitarian appeal of Cushy was significantly higher than that of Smartie. The Cohen's D value of 1.04 supports the large effect size of the manipulation. Therefore, this manipulation was also successful.

Table 5-6: One-Way ANOVA Analysis for Utilitarian Appeal Manipulation Check

Utilitarian Appeal	Mean	Std. Deviation	Std. Error	95% Confidence Interval		ANOVA			
				Lower Bound	Upper Bound	Sum of Squares	Mean Square	F	Sig.
Smartie (I-H & N-H)	4.45	1.40	.12	4.21	4.70	102.48	102.48	68.03	< .001
Cushy (I-U & N-U)	5.71	1.03	.09	5.53	5.89				

Based on the above analyses, the data set was deemed ready for research model validation.

5.4. Research Model Validation

I used IBM SPSS, version 28, and IBM SPSS AMOS, version 28, to validate the research model. This section presents the measurement model, common method bias, structural model, goodness of fit, effect size, moderation hypotheses, and control variable assessments.

5.4.1. Measurement Model Assessment

The first step in validating the measurement model was assessing the indicator reliability; therefore, I examined the indicator loadings to determine whether they were above the 0.70 threshold (Fornell and Larcker 1981). Based on the theory-driven nature of

the research model, and in addition to an exploratory factor analysis (EFA) to assess the loadings and cross-loadings of the indicators on the latent constructs (Farrell and Rudd 2009), I used a first-order confirmatory factor analysis (CFA) to measure the ability of the item scales to represent the latent constructs (Featherman and Pavlou 2003). The factorability of the data was tested using the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity. The Bartlett test results were significant (approximate chi-square = 6636.36, df = 325, Sig. = .000), and the overall KMO sampling adequacy index for the measurement indicators was .94, which justified the factorability of the data set and the relevance of the EFA analysis.

Table 5-7 Initial Loadings and Cross Loadings of Measures

	INT	FIT	FAM	INN	UTL	HDN
Interactivity (INT1)	**.929**	.022	.025	.001	-.093	-.003
Interactivity (INT2)	**.893**	-.074	.059	-.008	.085	-.002
Interactivity (INT3)	**.939**	-.010	-.045	.004	.002	.020
Perceived Fit (FIT1)	-.020	**.849**	.076	.009	.027	.042
Perceived Fit (FIT2)	-.014	**.796**	.061	-.017	.008	.184
Perceived Fit (FIT3)	.007	**.894**	.046	-.021	-.056	.106
Perceived Fit (FIT4)	-.024	**.902**	.011	-.026	.014	-.081
Perceived Fit (FIT5)	-.050	**.975**	.058	.007	-.034	-.025
Perceived Familiarity (FAM1)	-.031	.079	**.877**	-.011	-.012	.034
Perceived Familiarity (FAM2)	.086	.076	**.870**	-.067	.002	.028
Perceived Familiarity (FAM3)	-.010	-.018	**.947**	.037	.020	-.113
Perceived Innovativeness (INN1)	.030	.370	-.099	**.715**	-.175	.020
Perceived Innovativeness (INN2)	.058	.058	-.044	**.829**	-.048	.057

Perceived Innovativeness (INN3)	.032	.048	.017	**.866**	.075	-.048
Perceived Innovativeness (INN4)	-.041	-.253	-.016	**.774**	.052	.045
Perceived Innovativeness (INN5)	-.058	.012	.093	**.848**	.107	-.034
Utilitarian (UTL1)	.032	.011	.155	.070	**.627**	.143
Utilitarian (UTL2)	-.009	.246	-.075	.032	**.759**	-.071
Utilitarian (UTL3)	-.062	-.211	.122	.101	**.907**	.057
Utilitarian (UTL4)	.081	.361	-.155	-.048	**.503**	-.187
Utilitarian (UTL5)	.028	.271	-.103	-.111	**.769**	-.007
Hedonic (HDN1)	.039	-.104	-.008	.003	-.183	**.922**
Hedonic (HDN2)	.009	.018	-.034	.118	.037	**.822**
Hedonic (HDN3)	-.036	-.017	.026	.001	.094	**.877**
Hedonic (HDN4)	.014	.135	-.066	-.025	.159	**.748**
Hedonic (HDN5)	-.019	.090	-.017	-.033	.036	**.900**

The output of the EFA analysis indicated a couple of potential problems in the data set. I conducted an iterative process to solve each issue and re-ran the EFA analysis. First, the loading of the "Utilitarian4 (necessary/unnecessary)" and "Utilitarian1 (Effective/Ineffective)" indicators on the utilitarian construct was less than the .70 threshold, while the other indicator loadings were above the threshold for their intended latent constructs. Considering the very low cross-loadings of these indicators onto other constructs, I did not eliminate the "Utilitarian1" and "Utilitarian4" indicators at this stage and conducted a CFA to assess the model fit of the indicators and constructs included in the research model.

The first run of the CFA with the model fit indices GFI = 0.852, CFI = .956, and RMSEA = .064 implied that there were opportunities for model improvement. Through an iterative assessment of the model fit indices, I identified that the "Utilitarian4," "Fit4," and "Hedonic1" indicators created model fit discrepancies by inflating the chi-square value. First, I assessed the contribution of the "Fit4" indicator ("This product is what I am looking for") to the perceived fit construct. This indicator might be perceived differently by various audiences and might be confused with other fit indicator measures due to the lack of clarity of the item statement. In relation to other perceived fit indicators assessing the fit of the product with the audience's preferences, taste, and requirements, the Fit4 indicator was less clear and more ambiguous. The data supported this argument by demonstrating strong covariance between the error terms of this indicator and the other indicators. Therefore, the Fit4 indicator was eliminated.

The Hedonic1 indicator (fun/not fun) was also identified as a source of misfit because of its augmenting impact on the chi-square value of the model. Due to the meaning similarity between the Hedonic1 (fun/not fun) indicator and the other hedonic construct indicators, namely enjoyable/unenjoyable, dull/exciting, and not thrilling/thrilling, the Hedonic1 indicator was also eliminated.

Among the utilitarian construct indicators, only excluding the Utilitarian4 (necessity/unnecessity) indicator improved the model fit indices due to its low loading on the utilitarian latent variable. I did not eliminate the Utilitarian1 indicator (effectiveness/ineffectiveness), despite its lower-than-threshold loading on its intended latent variable in terms of the significance of product effectiveness on the utilitarian appeal

of the products and the very low cross-loading of this indicator on other constructs. In the resulting CFA model, the model fit indicators were GFI = .903, CFI = .982, RMSEA = .043, SRMR = .0410, which were within the acceptable model fit ranges. The resulting final loadings and cross-loadings are presented in the following table.

Table 5-8 Final Loadings and Cross Loadings of Measures

	INT	FIT	FAM	INN	UTL	HDN
Interactivity (INT1)	**.932**	.021	.025	.003	-.091	-.017
Interactivity (INT2)	**.896**	-.073	.059	-.004	.084	-.015
Interactivity (INT3)	**.941**	-.015	-.046	.000	-.005	.029
Perceived Fit (FIT1)	-.019	**.845**	.078	.016	.038	.028
Perceived Fit (FIT2)	-.013	**.781**	.062	-.016	.003	.198
Perceived Fit (FIT3)	.008	**.883**	.047	-.019	-.053	.108
Perceived Fit (FIT5)	-.051	**.970**	.059	.009	-.022	-.028
Perceived Familiarity (FAM1)	-.031	.079	**.879**	-.010	-.014	.030
Perceived Familiarity (FAM2)	.086	.072	**.871**	-.072	-.006	.041
Perceived Familiarity (FAM3)	-.012	-.014	**.947**	.034	.023	-.114
Perceived Innovativeness (INN1)	.030	.365	-.101	**.708**	-.178	.035
Perceived Innovativeness (INN2)	.059	.061	-.045	**.829**	-.050	.050
Perceived Innovativeness (INN3)	.031	.052	.014	**.862**	.072	-.039
Perceived Innovativeness (INN4)	-.038	-.249	-.016	**.788**	.059	.017
Perceived Innovativeness (INN5)	-.058	.017	.090	**.849**	.108	-.036
Utilitarian (UTL1)	.034	.013	.157	.084	**.620**	.133
Utilitarian (UTL2)	-.013	.252	-.077	.029	**.749**	-.045
Utilitarian (UTL3)	-.063	-.204	.121	.106	**.888**	.074

Utilitarian (UTL5)	.025	.277	-.103	-.109	**.760**	.007
Hedonic (HDN2)	.020	-.017	-.031	.122	-.016	**.865**
Hedonic (HDN3)	-.026	-.063	.026	-.008	.022	**.967**
Hedonic (HDN4)	.022	.099	-.065	-.031	.101	**.818**
Hedonic (HDN5)	-.008	.051	-.013	-.028	-.020	**.947**

Following the item reliability and CFA analysis, I used Cronbach's alpha and composite reliability to assess the reliability of the reflective constructs. The threshold value for Cronbach's alpha was .70, and the composite reliability of the reflective constructs was expected to exceed .60 (Bernstein and Nunnally 1994). As Table 5-9 demonstrates, all Cronbach's alpha (α) and composite reliability (CR) values exceeded their respective thresholds, ensuring that the construct reliability criteria were met.

Table 5-9 Reflective Construct Reliability and Validity Statistics

	α	**CR**	**AVE**	**INT**	**FIT**	**FAM**	**INN**	**UTL**	**HDN**
INT	0.91	0.91	0.773	**0.879**					
FIT	0.96	0.96	0.856	0.314	**0.925**				
FAM	0.90	0.90	0.756	0.395	0.509	**0.870**			
INN	0.89	0.93	0.763	0.324	0.674	0.420	**0.873**		
UTL	0.88	0.89	0.661	0.240	0.692	0.468	0.636	**0.813**	
HDN	0.94	0.95	0.810	0.320	0.699	0.453	0.677	0.652	**0.900**

α: Cronbach's Alpha, CR: Composite Reliability, AVE: Average Variance Extracted

To ensure convergent validity, all the constructs were measured using validated scales. For the validation assessment, I followed Gefen et al. (2000) to conduct a CFA and evaluate whether the GFI and NFI were greater than .90. The findings showed that the AGFI

was greater than .80 and that all indicator loadings were above .707 (Gefen et al. 2000). The CFA results verified the convergent validity, with the GFI = .903, AGFI = .873, NFI = .945, and all indicator loadings were above .707, as displayed in Table 5-8. Another indicator of convergent validity is the AVE of each construct exceeding the variance due to measurement error of that construct, which requires the AVE value of each construct to be greater than .50 (Au et al. 2008). The results of the measurement model analysis also verified that the AVE value of each construct exceeded .50 (Table 5-9).

Discriminant validity was also assessed through the relationship between the AVE value of each construct and its correlation with other constructs. According to Fornell and Larcker (1981) and Barclay et al. (1995), discriminant validity requires the square tool of the AVE value of each construct to be larger than the correlation between that construct and any other construct. In Table 5-9, besides the CR and AVE columns, the diagonal elements show the square roots of the AVE of the constructs, and the off-diagonal numbers represent the correlation between the constructs. According to these findings, all constructs met this requirement. Gefen and Straub (2005) argued that another indicator of discriminant validity is that the minimum difference between an item loading on its own construct and its loading on any other construct should be 0.10. Table 5-8 affirms that this criterion was also met.

Lastly, I checked for multicollinearity by assessing the correlation, VIF, and SMC values for each indicator. According to Meyers et al. (2006), bivariate correlations greater than .80 may indicate a potential multicollinearity issue. Table 5-9 shows that this was not an issue in this study. As a more advanced analysis of multicollinearity, the tolerance and VIF values were calculated to test whether all tolerance values were greater than .10 and

that the VIF values were less than 10 by setting each indicator as the dependent variable and all other indicators as independent variables in a series of multiple regressions. In these analyses, none of the tolerance values were below .10, and none of the VIF values were greater than 10, thereby implying that multicollinearity was not an issue for this specific data set (Hair Jr. et al. 2010).

5.4.2. Common Method Bias

Next, I tested the data set to ensure the absence of Common Method Bias (CMB) using two methods: Harman's One Factor Test and CFA Marker Technique (Williams et al. 2010). Following Podsakoff and Organ (1986), I conducted an EFA to assess the unrotated solution of a principal component analysis for all indicators so as to identify the existence of CMB if indicators mostly loaded on a single factor or one of the constructs accounted for more than 50% of the total variance in the data set. The unrotated principal component analysis suggested 5 factors with eigenvalues greater than 1. The first factor accounted for 48.4% of the variance and 5 factors together accounted for 78% of the variance in the data set. The eigenvalue of the last factor was 1.195. Many indicators loaded on components other than the first factor. The 48.4% variance being accounted for by the first factor is lower than the 50% threshold (Podsakoff and Organ 1986) and CMB is unlikely a concern for this data set. However, given the small difference between the variance explained by the first factor and the 50% threshold, I decided to use another technique to check for CMB.

Podsakoff (2012) recommends using CFA Marker Technique, if the source of common method bias is not known or valid measures to account for the extent of bias does not exist. In this technique, a marker variable is included in a series of SEMs which are

compared to each other to determine the extent of CMV in the data. If the model in which the loadings from the marker variable to substantive items are fixed to zero does not fit data better than the equivalent model with non-zero loadings, then CMV exists. And if the model in which estimates between substantive variables are replaced with estimates from the equivalent model that assumes no substantive-marker relationships fits the data better than the first model, then the variance biases the substantive relationships and CMB exists (Williams et al. 2010).

Following Williams et al. (2010), I implemented the CFA Marker Technique using a theoretically unrelated construct "Webpage Reliability" from the same dataset as the marker variable and implemented the four-step process to complete the analysis. First, I created the CFA model with the marker variable. Then I created the baseline model by fixing the regression weights of marker items and variances of marker item errors to values from the CFA model, variances of all variables to one, and covariances between the marker variable and each substantive variable to zero. I ran this model to record the covariances and fit indices. In the third step, I created the Method-C model (constrained model) by adding paths from the marker variable to each substantive item and constraining the substantive item factor loadings from the marker variable to be equal. I ran this model to record the fit indices. In the next step, I created the Method-U model (unconstrained model) by removing the constraint on the substantive item factor loadings from the marker variable. I ran this model as well to record the fit indices of the model.

The guidelines provided by Williams et al. (2010) were followed to interpret the findings. The significant χ^2 difference between Model-C and the baseline model indicated

that there is Common Method Variance (CMV) in the dataset. The statistically significant χ^2 distance between Method-C and Method-U demonstrated that the CMV in the data does not affect each substantive variable equally and Method-U fits data significantly better than Method-C. Based on these findings, I created the Method-R model using Method-U model to check if common method variance bias any relationship in the model by fixing the substantive factor covariances to their baseline values. The comparison of Method-R with Method-U was insignificant, indicating that the CMV in the data is not biasing the substantive relationships in the model. The analysis results of the χ^2 tests are summarized in Table 5-10.

Table 5-10: CFA Marker Technique Analysis Results

Model	χ2 (df)	CFI	RMSEA (90% CI)	LR of Δχ2	Model Comparison
CFA with marker	438.117 (254)	0.968	.053 (.044, .061)		
Baseline	519.911 (266)	0.956	.060 (.053, .068)		
Model-C	478.784 (265)	0.963	.056 (.048, .064)	41.127, *df*=1, *p*=0.00	vs. Baseline
Model-U	378.046 (244)	0.977	.046 (.037, .055)	100.738, *df*=21, *p*=0.00	vs. Model-C
Model-R	393.19 (259)	0.977	.045 (.035, .053)	15.144, *df*=15, *p*=0.44	vs. Model-U

The correlations between the marker variable and the substantive variables are provided in Table 5-11. Although correlation values over .20 between the marker and the substantive variables is identified as nonideal by Simmering et al. (2015), Williams and O'Boyle's (2015) study demonstrates the effectiveness of the technique using non-ideal markers with a negligibly small error rate as it is with ideal markers. It is also important to

note that the correlation values in Table 5-11 are comparable with the correlation values reported in Williams et al. (2010) method paper. Based on this literature and two methods applied in this study, I conclude that there is CMV of negligible extent in the dataset, which does not bias the structural model relationships.

Table 5-11: Marker Variable Correlation Table

	INT	FIT	FAM	INN	UTL	HDN
Marker	.206	.123	.117	.152	.329	.218

5.4.3. Structural Model Assessment

After verifying the reliability of the measurement, I assessed the predictive power of the proposed research model through a Latent Variable Path Analysis (LVPA) using IBM SPSS AMOS, version 28. To validate the structural model, multiple goodness-of-fit measures were assessed against threshold values provided in the literature.

The chi-square (χ^2) test was used to test the significance of the hypothesized relationships and the appropriateness of the proposed structural equation model. However, this test assumes multivariate normality and sufficiently large sample sizes. It may indicate a good model fit for highly complex models due to overparameterization and a bad model fit due to a large sample size (Bearden et al. 1982). Because of these shortcomings, I used descriptive goodness-of-fit measures to evaluate the model fit, in addition to χ^2 test statistics (Schermelleh-Engel et al. 2003).

One major descriptive measure of overall fit is the Root Mean Square of Error of Approximation (RMSEA) value, which mainly assesses whether the model fits well in the population through approximation (Schermelleh-Engel et al. 2003). While Steiger (1990) identify RMSEA values less than .05 as a close fit, Hu and Bentler (1999) suggested this threshold to be .06. The error of approximation, which refers to the misfit in the model and the population covariance matrix, is the main concern in this fit measure, which requires the goodness of fit to be supported by other fit indices.

The Root Mean Square Residual (RMR) is an overall model misfit indicator representing the remaining unexplained discrepancies between the sample covariance matrix and the population covariance matrix (Jöreskog and Sörbom 1981). A threshold value cannot be given for this measure to assess the badness-of-fit (Schermelleh-Engel et al. 2003). The Standardized RMR (SRMR) is introduced to overcome this problem with a rule of thumb that requires SRMR to be less than .05 to indicate a good fit (Hu and Bentler 1995).

In addition to overall model fit measures, model comparison measures can be used to assess the goodness of fit of a proposed research model. These measures compare the fit of the proposed model to some restrictive baseline model. Mostly used model comparison-based measures are the Normed Fit Index (NFI), Tucker-Lewis Index (TLI), Comparative Fit Index (CFI) and the Goodness-of-Fit Index (GFI). The usual threshold for the NFI measure is .95 for indicating a good fit relative to the baseline model. As the NFI measure is affected by the sample size, the Tucker-Lewis Index (TLI), which is also called as Non-normed Fit Index (NNFI), is also recommended. The threshold value for this index is .97,

while .95 is also acceptable (Schermelleh-Engel et al. 2003). The Comparative Fit Index (CFI) prevents poor fit estimations due to small sample sizes. The threshold value for this index is also .97, although .95 is also acceptable (Schermelleh-Engel et al. 2003). The Goodness-of-Fit Index, measures the extent of variance and covariance in the model-implied covariance matrix and indicates an acceptable fit when it is over .90 and a good fit when it is over .95 (Jöreskog and Sörbom 1989).

According to the results of the LVPA analysis, there was a good fit between the data and the proposed research model, with the RMSEA, SRMR, NFI, TLI, and CFI values greater than the defined goodness-of-fit thresholds, and the GFI value indicating an acceptable fit (Table 5-12). The estimate, standardized estimate, standard error, and R^2 values for each indicator, which were shown to support the validity of the structural model, are provided in Table 5-13.

Table 5-12 Goodness-of-Fit Measures

Goodness-of-Fit Indicator		Good Fit Criterion	Estimate
Absolute Fit	χ2(df)	n.s.	173.7 (117)
	RMSEA	< .05	.044
	SRMR	< .05	.033
Comparative Fit	NFI	> .95	.95
	TLI	> .97	.98
	GFI	> .95	.93
	CFI	> .97	.98

Table 5-13 Path Coefficient, Error, and R-Square Estimates

Variable	Measure	Estimate	S.E.	Std. Estimate	R^2
Interactivity	INT1	1.008***	.052	.890	.793
	INT2	.929***	.051	.850	.723
	INT3	1.000	-	.895	.801
Perceived Fit	FIT1	1.000	-	.909	.826
	FIT2	1.046***	.040	.934	.872
	FIT3	1.038***	.040	.938	.879
	FIT5	1.179***	.047	.922	.850
Perceived Familiarity	FAM1	.991***	.060	.856	.733
	FAM2	1.131***	.063	.912	.831
	FAM3	1.000	-	.840	.705
Perceived Innovativeness	INN1	.999***	.060	.808	.653
	INN2	.991***	.051	.876	.767
	INN3	1.103***	.050	.936	.876
	INN4	.614***	.073	.794	.424
	INN5	1.000	-	.869	.755
Utilitarian	UTL1	1.000	-	.816	.667
	UTL2	1.170	0.86	.822	.675
	UTL3	1.056	.071	.824	.679
	UTL5	1.184	.098	.792	.628
Hedonic	HDN2	1.000	-	.886	.785
	HDN3	1.083	.049	.906	.821
	HDN4	1.063	.053	.869	.755

HDN5	.984	.047	.925	.856

S.E.: Approximate Standard Error

5.4.4. Results of Hypothesis Testing

After assessing the structural model fit and verifying the good fit, I tested the proposed theoretical hypotheses to determine whether they were supported by the data. The results, which are presented in Figure 5-1 and Table 5-14, indicate that interactivity was positively associated with perceived product fit ($\beta = 0.45$; $\rho < 0.001$) and perceived product familiarity ($\beta = 0.28$; $\rho < 0.001$), thereby supporting H1 and H2. Perceived product fit was positively associated with perceived product innovativeness ($\beta = 0.50$; $\rho < 0.001$), thus supporting H3. The hypothesized positive association between perceived product familiarity and perceived product innovativeness was also supported by the data ($\beta = 0.19$; $\rho = 0.049$) referring to H4 in the research model.

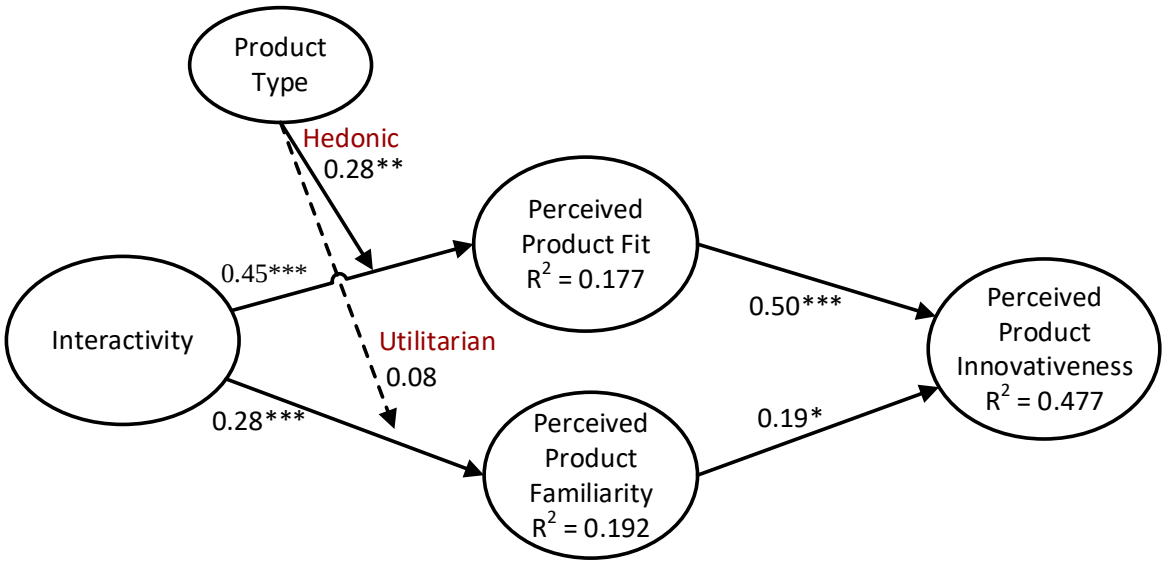

Figure 5-1: LVPA Model Results

On the other hand, product type, particularly the hedonic appeal of the presented product, was found to moderate the positive association between interactivity and perceived product fit ($\beta = 0.28$; $\rho < 0.01$), thus validating H5a. However, the moderating effect of product type for utilitarian products was found to be insignificant in moderating the positive association between interactivity and perceived product familiarity ($\beta = 0.08$; $\rho = 0.192$), refuting H5b.

Table 5-14: Results of the Hypotheses Testing

Hypothesis	*β*	*t*	*p*	Validation
H1: Higher interactivity of a product presentation medium will be positively associated with perceived product fit.	.45	4.476	<.001	Supported
H2: Higher interactivity of a product presentation medium will be positively associated with perceived product familiarity with the presented product.	.28	5.425	<.001	Supported
H3: Higher perceived product fit will be positively associated with perceived innovativeness of that product.	.50	9.510	<.001	Supported
H4: Higher perceived familiarity with a product will be positively associated with perceived innovativeness of that product.	.19	1.961	.049	Supported
H5a: Product type will positively moderate the relationship between	.28	2.764	.006	Supported

interactivity and perceived product fit, such that the effect is stronger for products higher in hedonic appeal than for those lower in hedonic appeal.				
H5b: Product type will positively moderate the relationship between interactivity and perceived product familiarity, such that the effect is stronger for products higher in utilitarian appeal than for those lower in utilitarian appeal.	.08	1.305	.192	Rejected

I used R^2 measures—which represent the percentage of the variance in the dependent variables explained by the corresponding independent variables—to further assess the predictive power of the proposed research model (Gefen et al. 2000). Although a threshold value was not established for this variable, Falk and Miller (1992) did recommend the explained variance in the dependent variables to be at least 0.10 in a model. In this study, this was exceeded by all dependent variables (Figure 5-1). According to the findings of the structural model assessment, the R^2 value of Perceived Product Fit was 0.177, the R^2 of Perceived Product Familiarity was 0.192, and the R^2 of Perceived Product Innovativeness was 0.477.

Following the explained variance analyses, I further assessed the mediation of perceived product fit and perceived product familiarity to understand whether they fully or partially mediated the relationship between interactivity and perceived product innovativeness. Following the method suggested by Baron and Kenney (1986), I first

estimated the direct impact of perceived interactivity on perceived product innovativeness and found it to be significant ($\beta = 0.392$; $\rho < 0.001$). I then added perceived product fit and perceived product familiarity to the model, which resulted in a nonsignificant relationship between perceived interactivity and perceived product innovativeness ($\beta = 0.136$; $\rho > 0.05$). Therefore, the relationship between perceived interactivity and perceived product innovativeness was found to be fully mediated by perceived product fit and perceived familiarity.

5.4.5. Interaction Plots for the Impact of Product Type

I tested the significance of the moderating effect of the hedonic appeal of the product on perceived product fit and the utilitarian appeal of the product on perceived product familiarity through AMOS-based SEM. As discussed in the previous sections, the results showed that the hedonic appeal of the product positively moderated the relationship between perceived interactivity and perceived product fit. However, the influence of the utilitarian product on increasing the extent of perceived product familiarity as a result of exposure to higher levels of interactivity was not significant. To further examine these two moderating effects, the Interaction software was used to draw the interaction plots of the differing strengths of these moderators on the mentioned relationships. The resulting plots for the varying levels of moderator values at $(\mu-3\sigma)$, $(\mu-2\sigma)$, $(\mu-\sigma)$, μ, $(\mu+\sigma)$, $(\mu+2\sigma)$, and $(\mu+3\sigma)$ are shown in Figure 5-2 and Figure 5-3, with the unstandardized regression coefficient of the independent variable on the dependent variable at the corresponding level of the moderator for that specific interaction line. As seen in Figure 5-2, with the increasing level of hedonic appeal, the nonsignificant relationship between interactivity and perceived

product fit for values below μ became significant for the moderator values at μ and above, thus supporting the findings of the SEM analyses. It should be noted that the negative unstandardized regression coefficients for moderator values below μ are statistically insignificant and do not indicate a negative moderation effect.

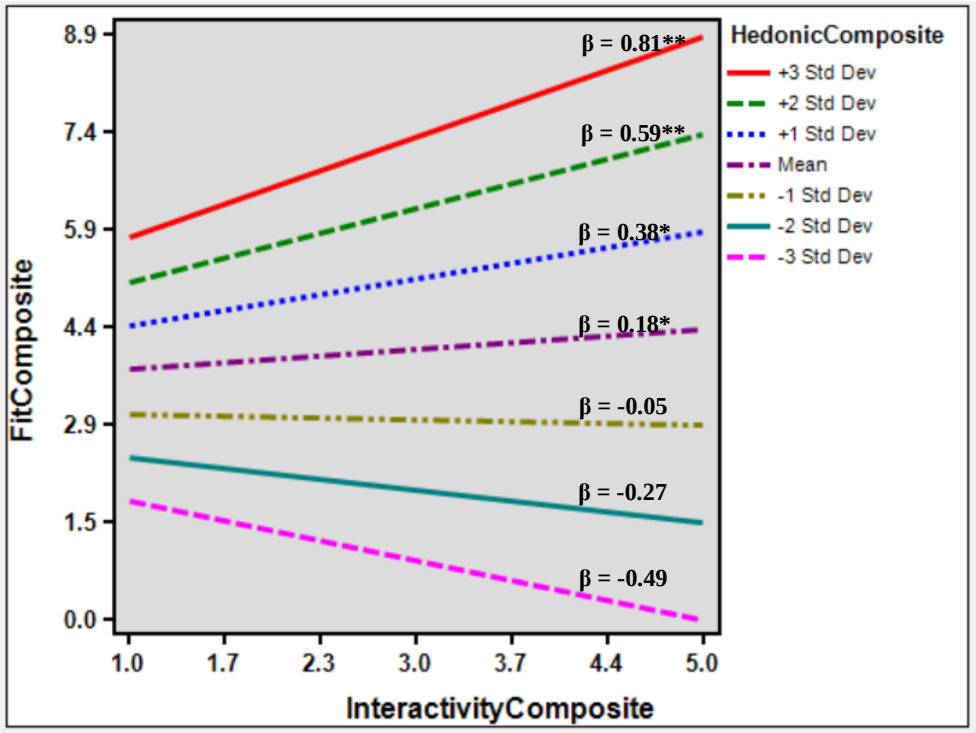

Figure 5-2: Impact of Hedonic Product Type on the Interactivity–Perceived Fit Relationship

On the other hand, Figure 5-3 demonstrates the influence of the utilitarian product type on the relationship between perceived interactivity and perceived product familiarity. As depicted in the figure, the relationship between interactivity and perceived product familiarity was significant for all levels of utilitarian dominancy (except at μ-3σ). Therefore, the utilitarian product type did not interact with perceived interactivity to increase the extent of perceived product familiarity, thereby supporting the findings of the SEM analysis.

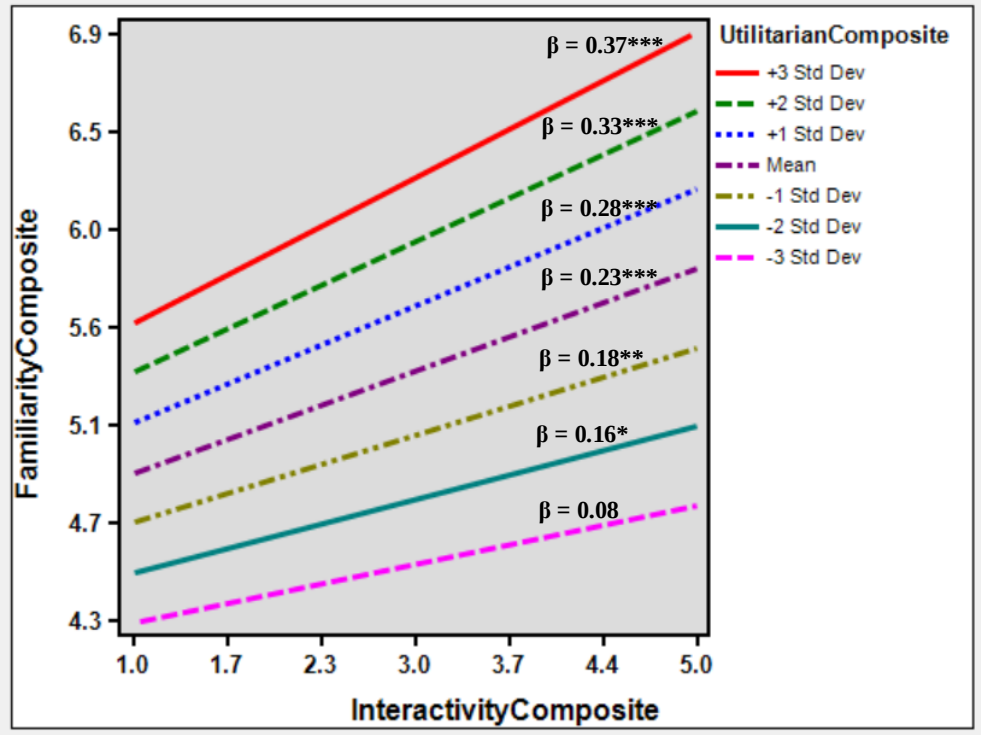

Figure 5-3: Impact of Utilitarian Product Type on the Interactivity–Perceived Familiarity Relationship

5.4.6. Analysis of the Impact of the Control Variables

The control variables included in the model were age, education level, and the participants' experience on online entrepreneurship platforms, all of which were addressed to ensure the validity and generalizability of the findings for the different age groups in terms of their different educational backgrounds and levels of experience on the mentioned platforms. All three of these variables were included in the model and linked to all endogenous variables, namely perceived product fit, perceived product familiarity, and perceived product innovativeness. Both the strength of the relationship between the control and endogenous variables and the impact of these relationships on the significance of the hypothesized paths were examined. As depicted in Table 5-15, except for the relationships

between age and perceived product fit and experience and perceived product familiarity, none of the paths were significant. According to these findings, age had a significant negative impact on perceived product fit, which may be explained by decreasing tolerance to new products with increasing age (Sawyerr et al. 2005). Nevertheless, experience on online entrepreneurship platforms was found to have a positive influence on perceived product familiarity, which could be due to the positive impact of familiarity with the way in which products are presented on these platforms on ease of learning (Moreno and Mayer 2007). As none of the hypothesized paths in the model changed algebraic sign, nor did any of the paths become non-significant with the addition or deletion of these three control variables, it can be concluded that the control variables did not affect the conclusions derived from the research model of this study.

Table 5-15: Control Variable Analysis

Control Variables	Endogenous Constructs	Path Coefficient	Significance
Age	Perceived Product Fit	-.27	p=0.004
	Perceived Product Familiarity	-.03	n.s.
	Perceived Product Innovativeness	.07	n.s.
Experience	Perceived Product Fit	.08	n.s.
	Perceived Product Familiarity	.09	p=0.026
	Perceived Product Innovativeness	-.02	n.s.
Education	Perceived Product Fit	-0.12	n.s.

Perceived Product Familiarity	0.02	n.s.
Perceived Product Innovativeness	-0.12	n.s.

Table 5-16: SEM Results for Non-Hypothesized Paths – Saturated Model Analysis

Non-Hypothesized Paths	*β*	*p*	√ / X
Interactivity → Perceived Product Innovativeness	.109	>.05	X
Perceived Product Fit → Perceived Product Familiarity	-.021	>.05	X
Hedonic Product → Perceived Product Fit	.884	<.001	√
Hedonic Product → Perceived Product Familiarity	.109	>.05	X
Hedonic Product → Perceived Product Innovativeness	.035	>.05	X
Utilitarian Product → Perceived Product Fit	.087	>.05	X
Utilitarian Product → Perceived Product Familiarity	.235	>.05	X
Utilitarian Product → Perceived Product Innovativeness	.207	>.05	X

5.4.7. Saturated Model Analysis

I assessed the significance of possible non-hypothesized relationships among the constructs of the research model through a saturated model analysis by establishing all

possible paths among the constructs in the originally proposed model. The resultant path coefficients and significance of the paths are given in Table 5-16.

As can be seen in Table 5-16, the direct relationship between perceived interactivity and perceived product innovativeness was insignificant. Therefore, it was relevant to analyze whether that relationship was fully mediated by resonance (which was operationalized as perceived product familiarity) to address the cognitive aspect and perceived product fit to address the emotional aspect. As mentioned in Section 5.4.4, the data analysis confirmed that this relationship was fully mediated by perceived product fit and perceived product familiarity.

In addition to analyzing the direct relationship between perceived interactivity and perceived product innovativeness, I analyzed the direct impact of the moderators (i.e., hedonic product type and utilitarian product type) on the three endogenous constructs. Although the impact of the utilitarian appeal of the presented product on perceived product familiarity and perceived product fit were insignificant, the impact of the hedonic appeal of the presented product on perceived product fit was found to be significant. Given that perceived product fit addresses the emotional aspect of resonance and that the hedonic appeal of a product is related to its emotional appeal, the significance of this relationship was reasonable. I found that the impact of the hedonic appeal of the presented product on the perceived familiarity of the product was insignificant. The relationship between perceived product fit and perceived product familiarity was also insignificant.

Chapter 6: Discussion and Conclusion

Online entrepreneurship platforms provide entrepreneurs with an invaluable opportunity to advertise innovative ideas to a large spectrum of audiences and seek funding for these ideas, affording less dependence on geographical proximity with potential resources. However, on such platforms, the success rate of technology projects, which aim to build tangible innovative products, is lower than that of any other type of project (e.g., "The Kickstarter Fulfillment Report" 2022). The innovativeness of these products plays a crucial role in convincing the audience to provide the required financial support (Le Pendeven and Schwienbacher 2021; Oo et al. 2019; Szymanski et al. 2007). From an audience perspective, perceived product innovativeness is influenced by both the novelty and meaningfulness of the new product (Amabile 1983; de Brentani 1989; Fang 2008; Sethi et al. 2001), and meaningfulness emerges through interaction (McDonnell et al. 2017). Although an audience's interaction with innovative products on online mediums is highly limited, technological advancements in web technologies have increased the use of interactive online mediums, specifically in marketing and e-commerce domains, enabling audiences to experience the product in a way that simulates direct interaction in the physical world (Klein 2003). However, to the best of my knowledge, none of these studies sought to analyze the impact of interactivity on perceptions in terms of seeking funding for innovative product ideas or examining the impact of interactivity on innovativeness perception in any of the contexts studied. Following the product innovativeness literature on identifying meaningfulness as a major driver of innovativeness perception, the main objective of this

thesis study was to investigate the impact of higher interactivity on product-related innovativeness perception through increased perceived meaningfulness.

The first research question was "How and to what extent does the interactivity of new product presentations on online entrepreneurship platforms influence the perceived innovativeness of such products?" Based on the theory of resonance, the impact of interactivity on perceived product innovativeness has been hypothesized as being mediated by resonance. This is defined as a bi-partite construct with emotional and cognitive dimensions (Giorgi 2017), where the cognitive dimension of product–audience resonance is operationalized as perceived product familiarity and the emotional dimension as perceived product fit (Giorgi 2017; Pratt 2000). The confirmed effect of increasing interactivity on perceived product familiarity ($\beta = 0.28$, $p < 0.001$) and perceived product fit ($\beta = 0.45$; $\rho < 0.001$) is in line with the theory of resonance, which states that resonance is a meaning-making process that occurs through interaction. Moreover, the findings support the argument that emotional and cognitive resonance are positively associated with the extent of perceived product innovativeness ($\beta = 9.510$; $\rho < 0.001$, $\beta = 1.961$; $\rho < 0.05$, respectively), which helps in convincing the audience that the innovation is not farfetched or bizarre.

As resonance between an innovative product and its audience is operationalized as a bi-partite structure with cognitive and emotional dimensions, the hedonic or utilitarian appeal of the product under examination was at the center of the second research question—that is, whether the type of the product (hedonic or utilitarian) moderated the relationships

between interactivity and resonance. To answer this research question, two products of varying appeal in terms of hedonic and utilitarian dominancy were used.

The first hypothesis regarding the moderating effect of product type on the interactivity–resonance relationship tested the interaction effect of hedonic product appeal on the relationship between interactivity and perceived product fit. This hypothesis was supported by the experimental results with $\beta = 0.28$ for $\rho < 0.01$. This finding is in line with extant findings that demonstrate that the evaluation of hedonic products is mostly influenced by the affective response stemming from the product–audience interaction experience (e.g., Kempf 1999; Melnyk et al. 2012).

The second hypothesis regarding the proposed moderating effect of product type tested the interaction effect of utilitarian product appeal on the relationship between interactivity and perceived product familiarity. This hypothesis was not supported by the experimental results. Although there are multiple studies exemplifying the impact of utilitarian product appeal on cognitive responses to products (e.g. Melnyk et al. 2012), Kempf (1999) revealed inconclusive findings by demonstrating that the utilitarian appeal of products relates to both the hedonic and utilitarian responses from the product experience. Therefore, aligning with Kempf's findings, the experimental results of this study also provide evidence concluding that the utilitarian appeal of a product does not necessarily moderate the impact of interactivity on cognitive resonance, while the hedonic appeal of a product moderates the positive impact of interactivity on emotional resonance.

The proposed and validated model makes significant theoretical contributions to scholarly work on perceived product innovativeness and practical implications for increased success in online innovative product funding, the subjects of the following sections.

6.1. Contributions to Theory

The main purpose of this research was to build and validate a model that would help us conceptualize the perceived meaningfulness of innovative products and further study the impact of interactivity on perceived product innovativeness through this concept. The meaningfulness perception regarding product innovation has frequently been examined in conceptual studies aiming to contribute to the product innovativeness literature. However, to the best of my knowledge, this study is the first to provide a basis for the inherent dimensions of meaningfulness and its emergence mechanism for the further development of this stream of research. Previous studies on the relationship between perceived product meaningfulness and product innovativeness have been at the conceptual level, or the meaningfulness of the innovative product has been addressed at the item level in the overall innovativeness scale. Therefore, this study advances the product innovativeness literature by conceptualizing meaningfulness as a separate first-order construct to assess the influence of this perception on perceived product innovativeness.

Another important theoretical contribution of this study is the use of the concept of resonance to account for the perceived meaningfulness of an innovative product to its intended audience. Indeed, the resonance concept has mostly been used in the framing literature. However, it has also been proposed as a useful tool to analyze the variations between audiences' reactions to specific technological innovations (Giorgi 2017).

According to this perspective, as the success or failure of technological innovations is an outcome of how these innovations are framed, the resonance concept has the potential to shed light on these diverse reactions (Giorgi 2017). This research study took this proposition further by using the resonance concept to search for the underlying mechanism of the emergence of perceived product innovativeness. As the increased meaningfulness of an innovative product decreases the awkwardness and incongruity perceptions regarding that product, in this empirical study, the extent of resonance was evinced as being related to how the innovations would be received, thus supporting the proposed use of the resonance concept. Furthermore, the findings of this study evinced meaningfulness as a multi-dimensional concept with both emotional and cognitive resonance dimensions.

By applying Giorgi's (2017) conceptual model of resonance to analyze the meaningfulness perception regarding a particular innovation, this study also extends the application domain of the resonance concept and contributes to both the product innovativeness and resonance literature by initiating new research areas and streams at the intersection of these two areas. This study combines these two concepts to provide a deeper understanding of product innovativeness perception.

In addition, grounded in theory of resonance theory, this study demonstrated that providing the audience with the opportunity to interact with innovative products on online mediums can increase the cognitive and emotional resonance that emerges between the audience and the product. The empirical findings of the study contribute to the theory of resonance by justifying the theorized role of interaction between an audience and a product

in the emergence of resonance and helping researchers better understand why interaction is necessary for resonance to emerge or increase in cognitive and emotional terms.

6.2. Contributions to Practice

In addition to the preceding comments regarding the theoretical contributions, the results regarding the impact of interactivity on perceived product innovativeness also have significant practical implications for any type of online platform. The main practical implication of this research study is tackling the trend of failure in funding technology products. While recording the highest amount of unsuccessful dollar value, technology products are more costly to build, riskier in providing the claimed benefits, and more difficult to imagine and self-reference, all of which contribute to this failure trend.

Entrepreneurs who cannot attract enough funding for their ideas need to try multiple times on multiple platforms, which costs time and money and creates increased risk for ideas to be stolen. Thus, entrepreneurs need to get the required funding to materialize their product ideas in a timely manner.

Nevertheless, the innovativeness of product ideas significantly increases the probability of funding success (Le Pendeven and Schwienbacher 2021; Oo et al. 2019). Specifically, ideas that are perceived as higher in innovativeness by the audience attract more people who are willing to fund and raise more capital than ideas perceived as less innovative (Le Pendeven and Schwienbacher 2021). A meta-analysis validated this argument with empirical evidence of the positive impact of product innovativeness on financial performance (Szymanski et al. 2007). Venture capitalists also seek higher

innovativeness to invest in technology ideas by investing three times more into higher innovativeness than lower innovativeness (Timmons and Bygrave 1986).

With this motivation, this study aimed to enhance the perceived innovativeness of new technology products, specifically from the audience's perspective, to alleviate the observed phenomenon on online entrepreneurship platforms. By increasing product–audience interaction, the failure percentage of technology products could be reduced by enhancing meaningfulness and, thus, the innovativeness perception regarding such products.

Based on the above argument, the anticipated practical contribution of this study is its demonstration of the positive influence of interactive presentation alternatives on audiences' (i.e., potential backers') innovativeness perception of new technology products and, thus, providing a remedy for the lower success rate of technology products on online entrepreneurship platforms.

6.3. Limitations and Future Research

Notwithstanding its theoretical and practical contributions, this study has some limitations that present avenues for future research. The first limitation is that the experiment was conducted for one product pair, which is a common limitation of experimental studies on products (e.g., Jiang and Benbasat 2004; Smith 1993). The experimental product idea in this research was chosen because of the relevance of the concept to current crowdfunding product ideas on target online entrepreneurship mediums in terms of representativeness. Nevertheless, the relative effect of interactivity may depend on specific attributes of products from different categories. For instance, while interactivity

has been found to be effective in changing the perceived innovativeness of a product intended for frequent daily use, it may not be effective for products with which the audience will not be interacting in their daily routine. Experimenting with products from different categories with differing complexities would strengthen the generalizability of the findings. The experiment may also be conducted for non-technology products to analyze the extent to which the study findings can be extended to other types of products.

Second, the age of the participants recruited by the market research firm is skewed towards older adults. This is a result of the very high speed of data coming through, and the inability of the market research firm to step in and stop specific age groups from coming into the survey in time. I set specific acceptance criteria based on quality, which required the market research firm to control not only how many participants are recruited from specific demographics but also the demographics of the successful participants (i.e, those participants that complete the experiment and survey within the set quality standards). It would appear that the older age group was being more serious than younger age group in terms of their participation in the study. Due to the fact that recruited participants are allowed into the study in batches, it was very difficult to keep the participants' age balanced between age groups. To check for the impact of this skewed sample on the results of this study, I added age as a control variable and concluded that age did not affect the relationships in the model in terms of direction or significance.

Third, the R^2 values of the mediators (i.e., perceived product fit and perceived product familiarity) arguably point to the probable existence of better scales to operationalize cognitive and emotional resonance between the product and audience and,

thus, affect innovativeness perception. Following Giorgi's (2017) and Pratt's (2000) research, cognitive resonance between an innovative product and an audience is operationalized as perceived product familiarity, and emotional resonance in the same context is operationalized as perceived product fit. Further research can inform the extent to which these two scales cover the intended context of the two latent constructs.

Fourth, the study participants were sampled among Canadian and US online users. As cross-country cultural differences may have an impact on how an innovation is received (Busse and Khatib 2013), this limitation should be considered in generalizing the findings of this research to other cultures. Future research may aim to analyze the impact of interactivity on perceived product innovativeness in other cultures so as to provide a stronger basis for the generalizability of the findings.

Fifth, as identified in Subsection 5.4.6 of this thesis, a few control variables were found to have statistically significant associations with some of the latent variables in the research model. Although the probable impact of these associations on the findings was discussed within the scope of this thesis, further research may help explain the extent to which the identified relationships can affect the findings.

Lastly, in this study, the research questions were addressed using quantitative data. The findings could have been strengthened by qualitative, open-ended questions regarding the participants' perceptions of the presented products.

6.4. Conclusion

This study aimed to extend research on the meaningfulness perception regarding new product ideas through its conceptualized influence on overall product innovativeness perception. It contributes to product innovativeness research by using the resonance concept to account for the meaningfulness perception regarding innovative product ideas in both cognitive and emotional dimensions and suggests that the resonance between a virtually presented innovative product and the audience can be influenced by increased interaction between the product and the audience, which can change how innovative the product is perceived. Thus, the study results showed that the increased virtual interaction between a new technology product and the audience can be used to foster resonance between this product and audience. In so doing, the results of the study revealed that the meaningfulness perception regarding a product innovation also plays a significant role in the overall innovativeness perception. This study also identified a positive association between the hedonic appeal of the presented product and the impact of the interaction on emotional resonance, which evinces the higher effectiveness of interactivity on hedonic products. Combining the study findings with those of extant research on the positive impact of higher meaningfulness perception on new product funding success leads to the conclusion that a higher potential for the funding success of highly innovative technology product development projects can be achieved through higher interaction between the new products and the audience.

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Appendix A: Consent Form

STUDENT INVESTIGATOR:
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Mcmaster University
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(289) 962-4930

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PURPOSE OF THE STUDY

Using online crowdfunding platforms, such as Kickstarter and Indiegogo, it is possible for entrepreneurs to fund new product ideas. The size of contribution each supporter can make may be as little as 5$, but total contributions may add up to millions of dollars. Depending on the type of platform and the amount of contribution, supporters receive various rewards, such as samples of the presented product, interest payments on their support, or equity in the business, all of which depends on the successful completion of the crowdfunding campaign. Before starting the experiment and answering the following questions, imagine yourself as potential supporter. Examine the products you are presented with the aim of judging whether they are worth your contribution.
The purpose of this study is to determine how you think and feel about the product as a result of your examination.

WHAT WILL HAPPEN DURING THE STUDY?

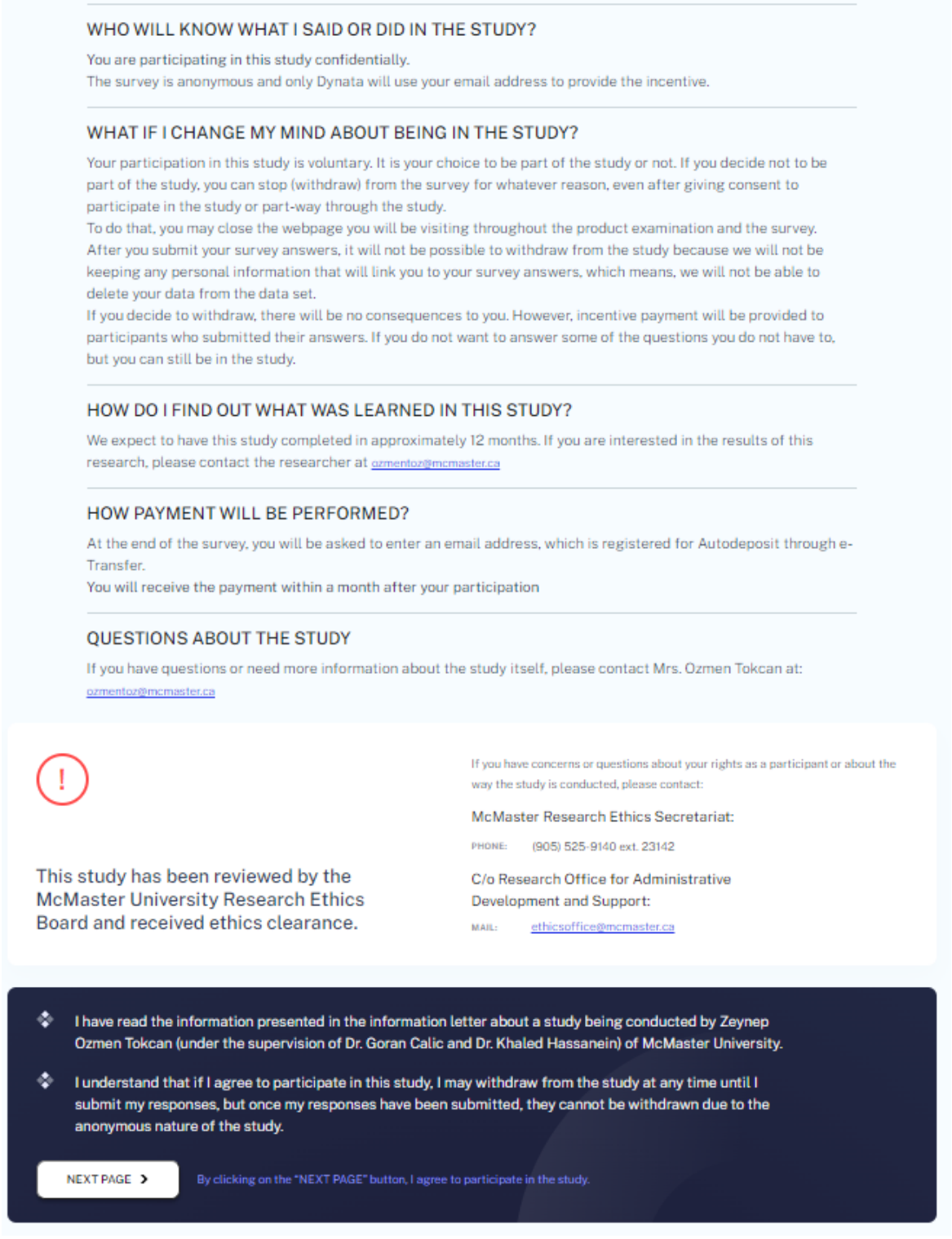
If you consent to participate, you will be directed to a fictitious product presentation webpage. Before the product is presented, you will be informed about the features of the webpage environment and how you can navigate through the page and examine the product. You may examine the product as much as you like. Upon completion of your examination, you will be asked to fill-out a survey to record your feedback.
Your honest and thoughtful responses are important to us and to the study.
To ensure the quality of survey data, your responses will be subject to sophisticated statistical control methods. Responding without reading the product description carefully and interacting with the 3D model of the product will be flagged for low-quality. You will be compensated only if you follow the instructions before clicking the "Next Page" button to be directed to the survey. Filling out the survey will take about 15 minutes.

ARE THERE ANY RISKS TO DOING THIS STUDY?

The risks involved in participating in this study are minimal. The product examination and the survey will be online, and you will be provided a two weeks-long period to choose a convenient time to do the examination and the survey. Please be informed that you may withdraw from the study anytime if you wish.

ARE THERE ANY BENEFITS TO DOING THIS RESEARCH?

You will be paid the incentive you agreed upon after you entered into the study for reviewing a product presentation on a fictitious webpage that emulates an online entrepreneurship platform, carefully examine the product and all aspects of the campaign webpage, and then answer the survey.
Online entrepreneurship platforms provide the main funding resources to the entrepreneurs to help them realize their innovative ideas. As another benefit, your participation in this research may enable you examine a product as a potential backer of that product and will also help us to understand the impact of the presentation design on the potential investors' product related perceptions.



WHO WILL KNOW WHAT I SAID OR DID IN THE STUDY?

You are participating in this study confidentially.
The survey is anonymous and only Dynata will use your email address to provide the incentive.

WHAT IF I CHANGE MY MIND ABOUT BEING IN THE STUDY?

Your participation in this study is voluntary. It is your choice to be part of the study or not. If you decide not to be part of the study, you can stop (withdraw) from the survey for whatever reason, even after giving consent to participate in the study or part-way through the study.
To do that, you may close the webpage you will be visiting throughout the product examination and the survey. After you submit your survey answers, it will not be possible to withdraw from the study because we will not be keeping any personal information that will link you to your survey answers, which means, we will not be able to delete your data from the data set.
If you decide to withdraw, there will be no consequences to you. However, incentive payment will be provided to participants who submitted their answers. If you do not want to answer some of the questions you do not have to, but you can still be in the study.

HOW DO I FIND OUT WHAT WAS LEARNED IN THIS STUDY?

We expect to have this study completed in approximately 12 months. If you are interested in the results of this research, please contact the researcher at ozmentoz@mcmaster.ca

HOW PAYMENT WILL BE PERFORMED?

At the end of the survey, you will be asked to enter an email address, which is registered for Autodeposit through e-Transfer.
You will receive the payment within a month after your participation

QUESTIONS ABOUT THE STUDY

If you have questions or need more information about the study itself, please contact Mrs. Ozmen Tokcan at:
ozmentoz@mcmaster.ca

This study has been reviewed by the McMaster University Research Ethics Board and received ethics clearance.

If you have concerns or questions about your rights as a participant or about the way the study is conducted, please contact:

McMaster Research Ethics Secretariat:

PHONE: (905) 525-9140 ext. 23142

C/o Research Office for Administrative Development and Support:

MAIL: ethicsoffice@mcmaster.ca

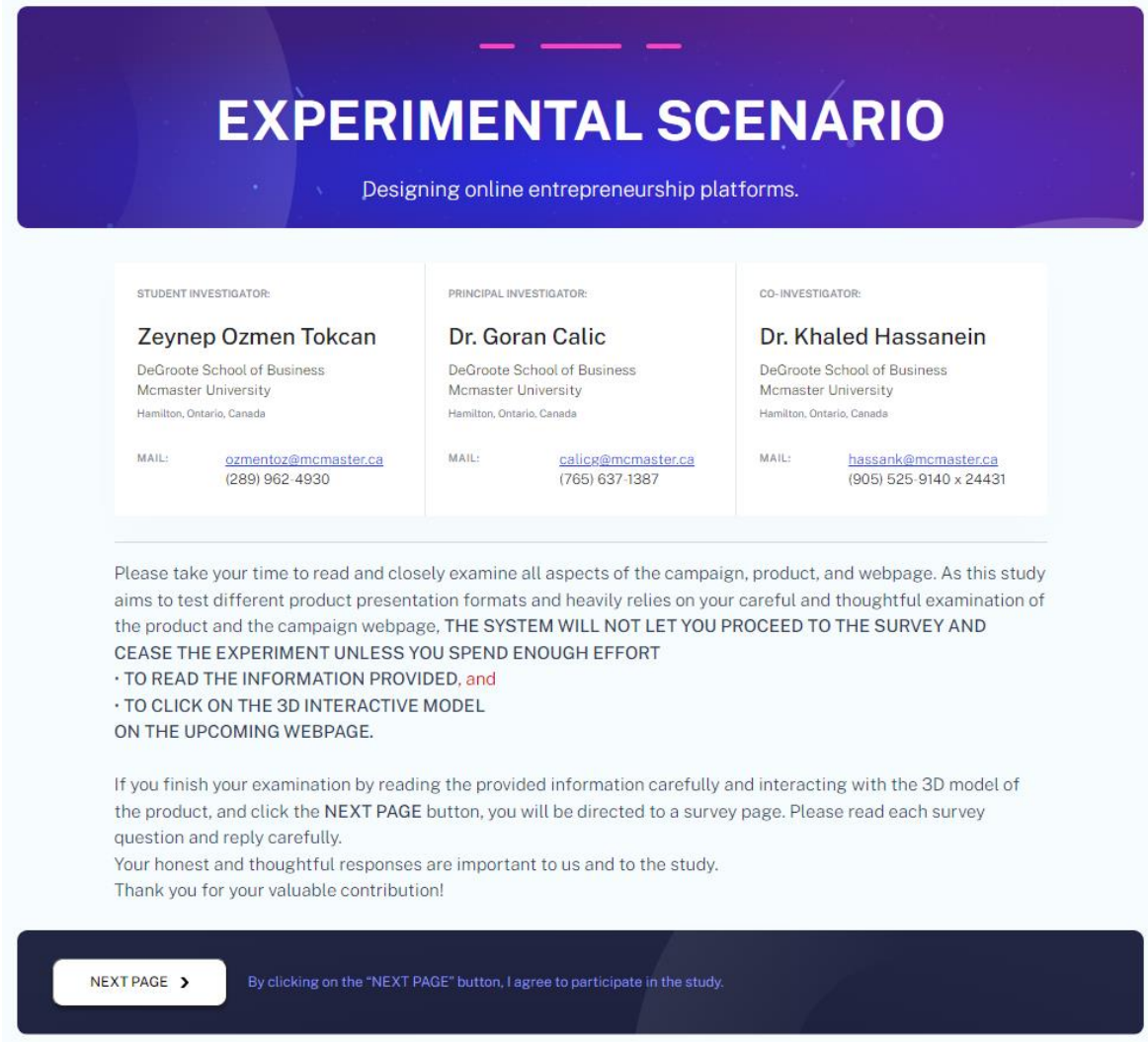
I have read the information presented in the information letter about a study being conducted by Zeynep Ozmen Tokcan (under the supervision of Dr. Goran Calic and Dr. Khaled Hassanein) of McMaster University.

I understand that if I agree to participate in this study, I may withdraw from the study at any time until I submit my responses, but once my responses have been submitted, they cannot be withdrawn due to the anonymous nature of the study.

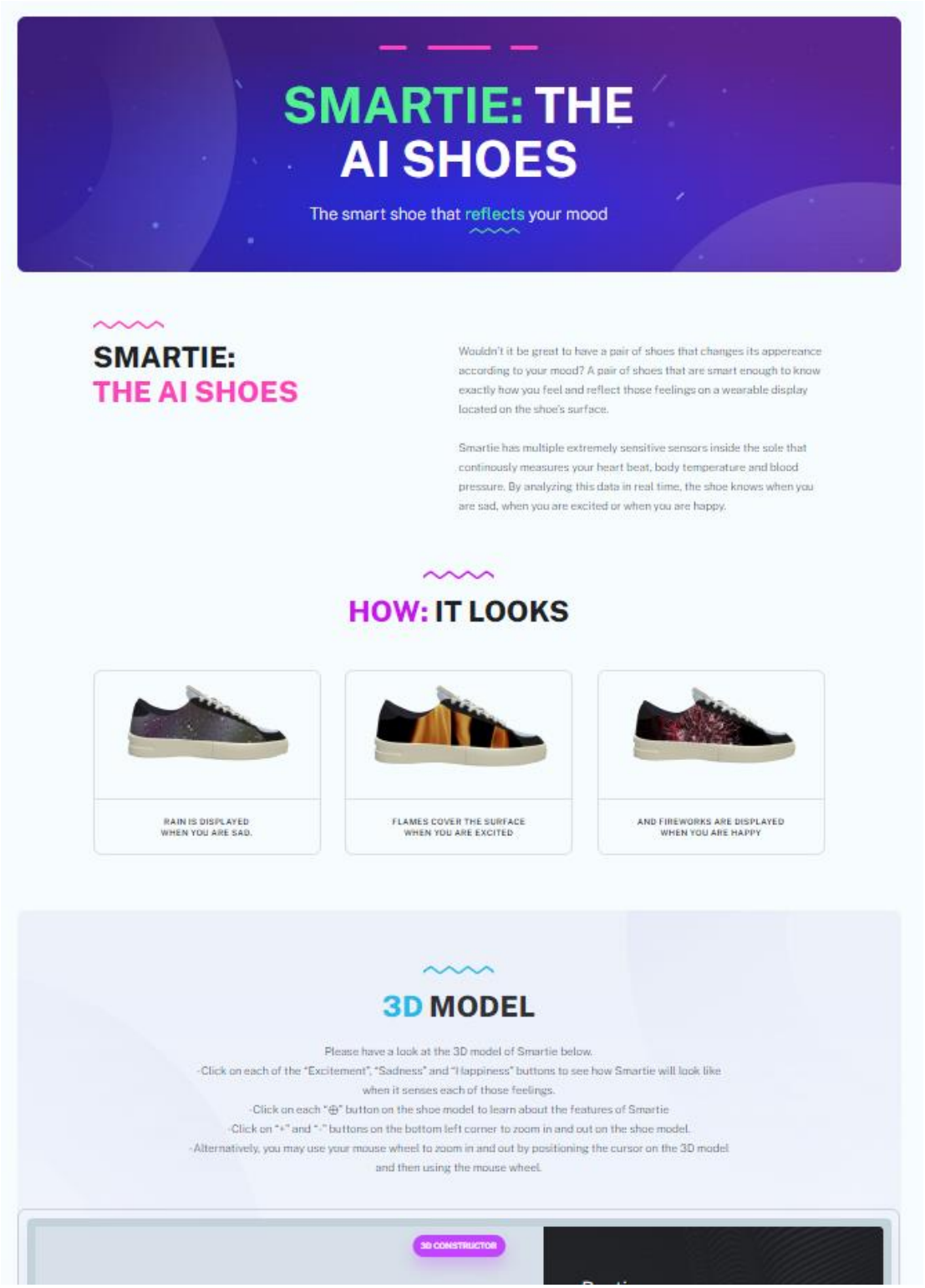
NEXT PAGE >

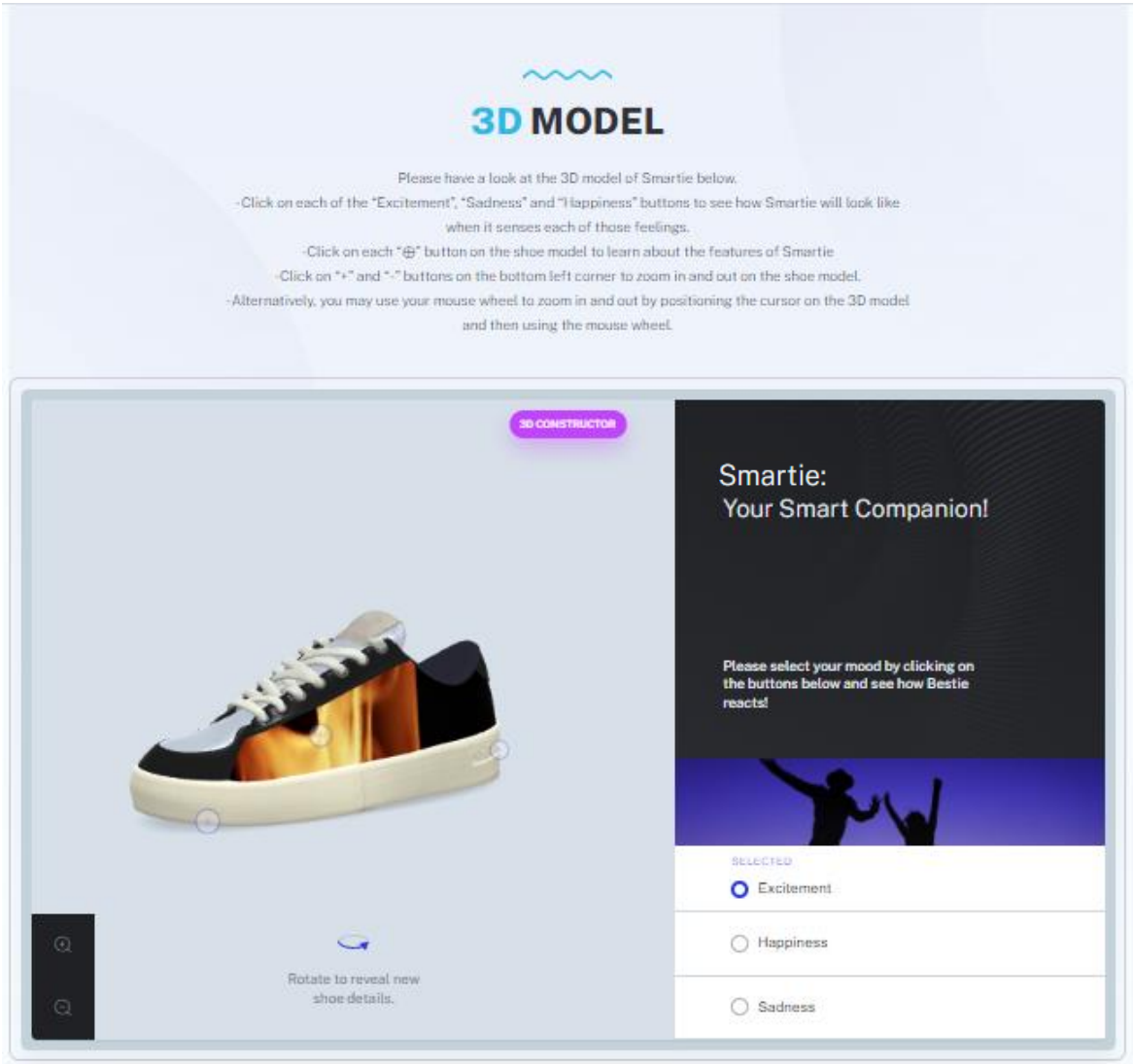
By clicking on the "NEXT PAGE" button, I agree to participate in the study.

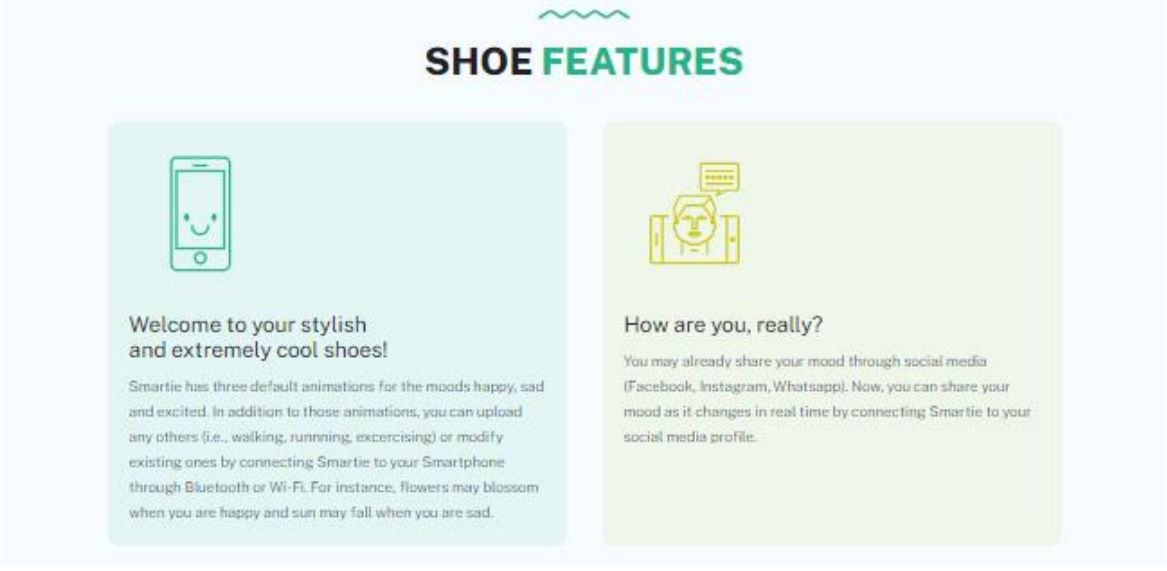
Appendix B: Experimental Scenario Web Page

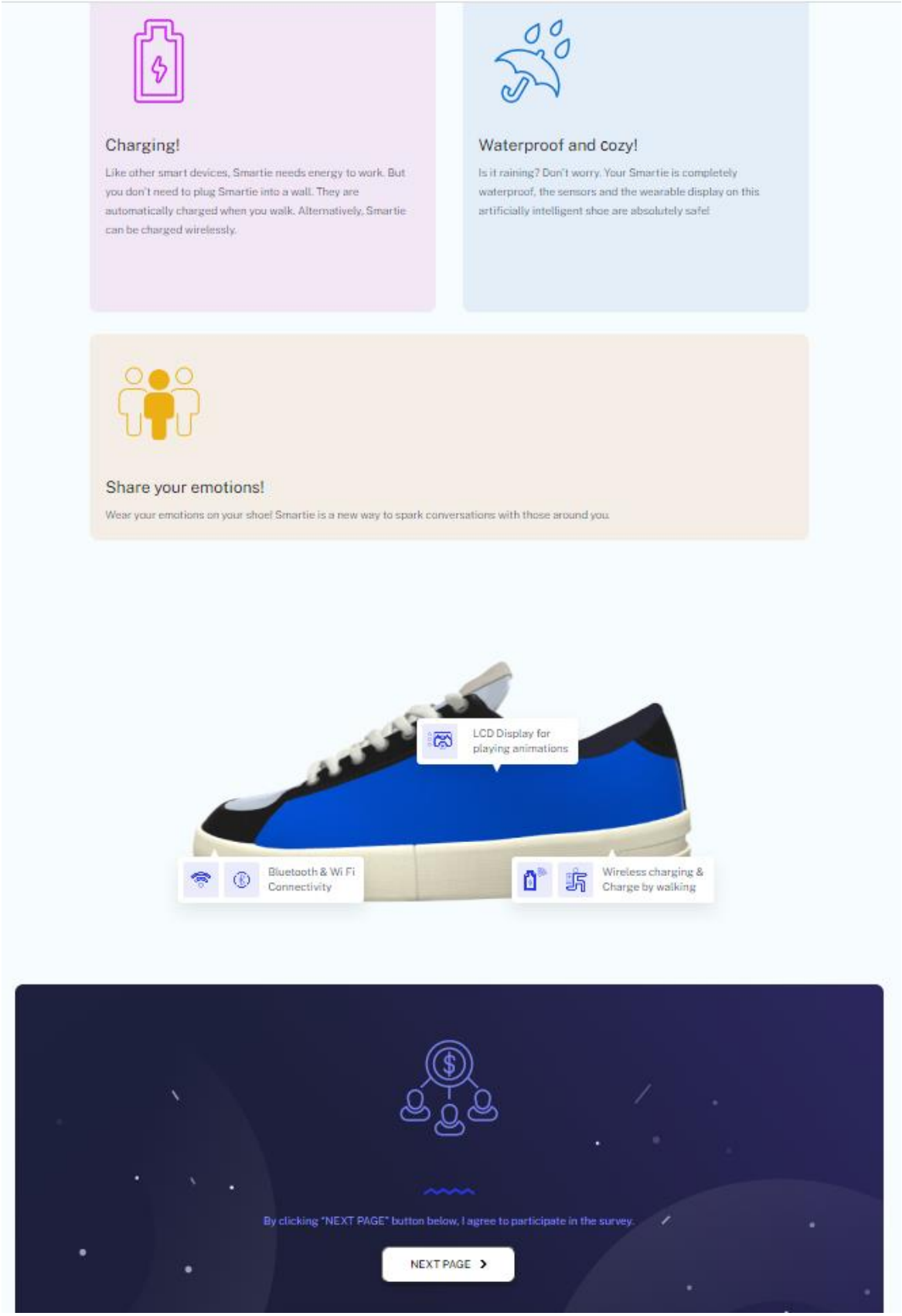


Appendix C: Interactive Hedonic Product Presentation Web Page

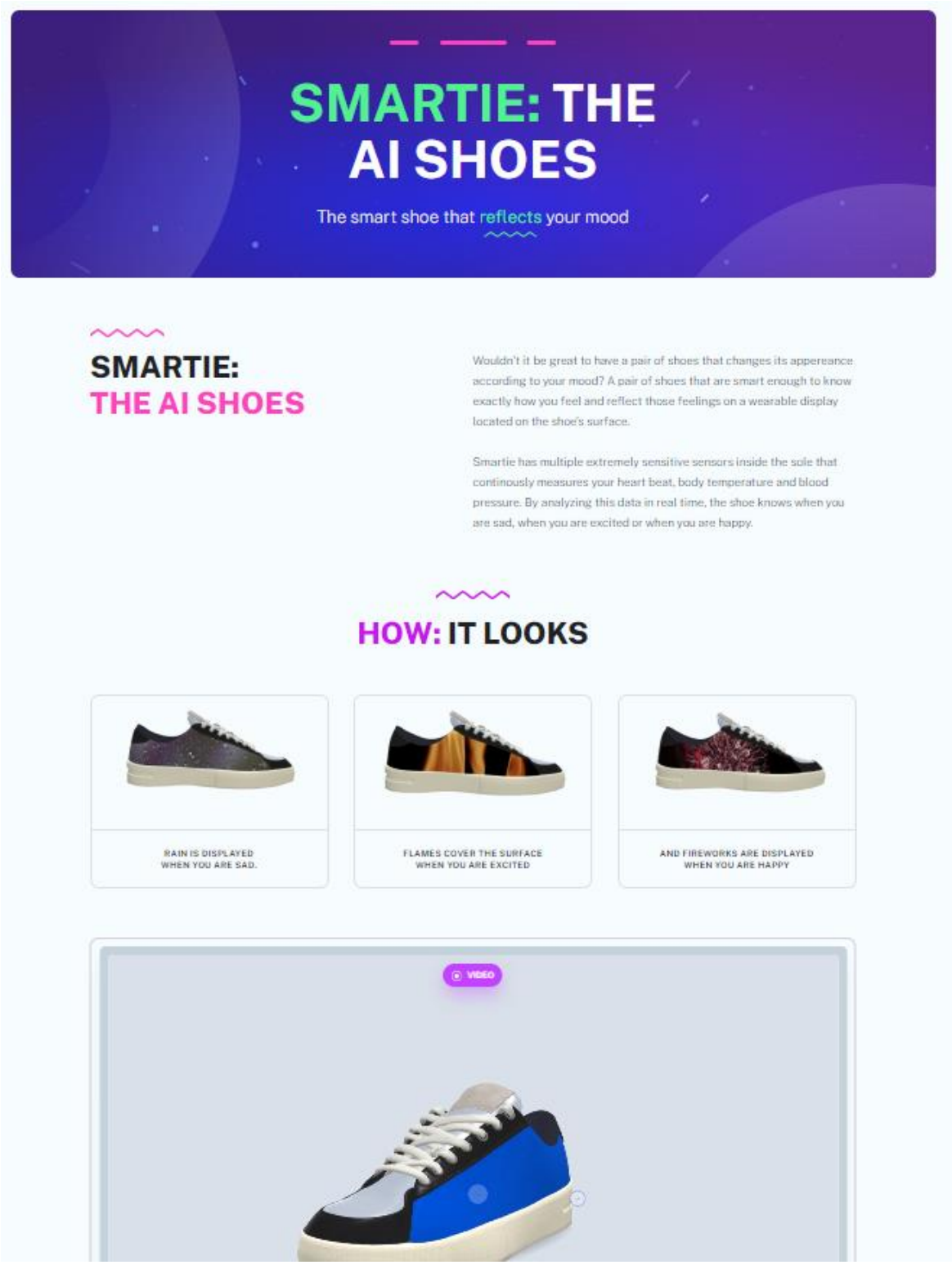


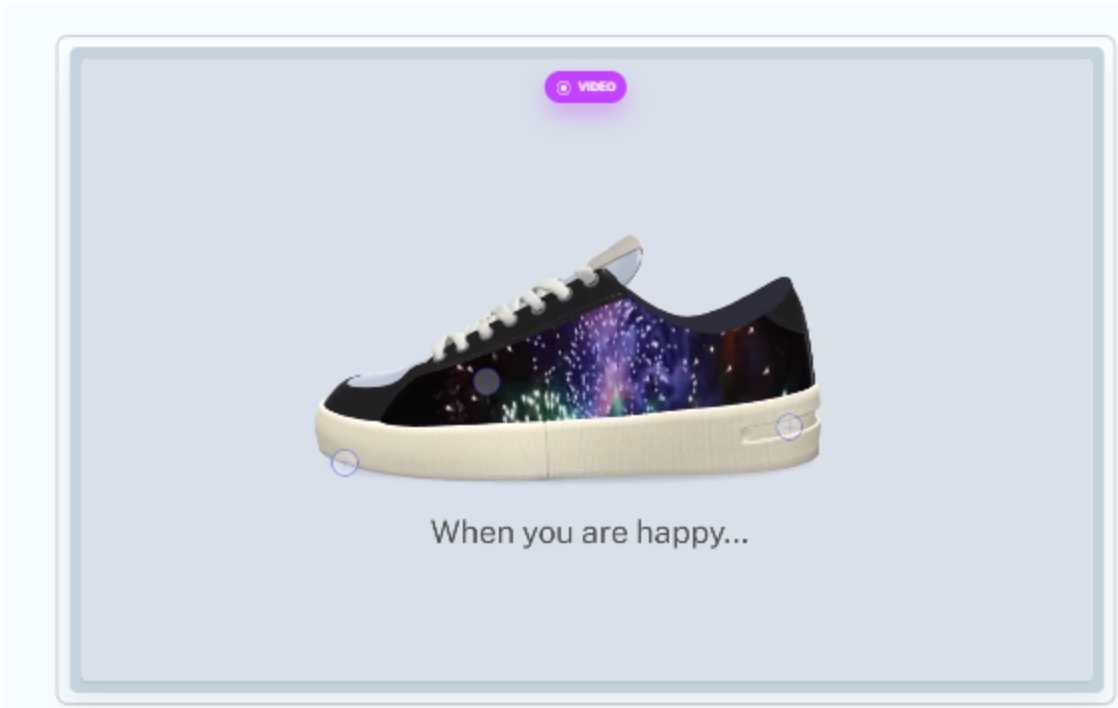

3D MODEL
Please have a look at the 3D model of Smartie below.
-Click on each of the "Excitement", "Sadness" and "Happiness" buttons to see how Smartie will look like when it senses each of those feelings.
-Click on each "⊕" button on the shoe model to learn about the features of Smartie
-Click on "+" and "-" buttons on the bottom left corner to zoom in and out on the shoe model.
-Alternatively, you may use your mouse wheel to zoom in and out by positioning the cursor on the 3D model and then using the mouse wheel.
3D CONSTRUCTOR
Smartie:
Your Smart Companion!
Please select your mood by clicking on the buttons below and see how Bestie reacts!
SELECTED
Excitement
Happiness
Sadness
Rotate to reveal new shoe details.


SHOE FEATURES
Welcome to your stylish and extremely cool shoes!
Smartie has three default animations for the moods happy, sad and excited. In addition to those animations, you can upload any others (i.e., walking, running, excercising) or modify existing ones by connecting Smartie to your Smartphone through Bluetooth or Wi-Fi. For instance, flowers may blossom when you are happy and sun may fall when you are sad.
How are you, really?
You may already share your mood through social media (Facebook, Instagram, Whatsapp). Now, you can share your mood as it changes in real time by connecting Smartie to your social media profile.


Charging!
Like other smart devices, Smartie needs energy to work. But you don't need to plug Smartie into a wall. They are automatically charged when you walk. Alternatively, Smartie can be charged wirelessly.
Waterproof and cozy!
Is it raining? Don't worry. Your Smartie is completely waterproof, the sensors and the wearable display on this artificially intelligent shoe are absolutely safe!
Share your emotions!
Wear your emotions on your shoe! Smartie is a new way to spark conversations with those around you.
LCD Display for playing animations
Bluetooth & Wi Fi Connectivity
Wireless charging & Charge by walking
By clicking "NEXT PAGE" button below, I agree to participate in the survey.
NEXT PAGE

Appendix D: Non-Interactive Hedonic Product Presentation Web Page





SHOE FEATURES

Welcome to your stylish and extremely cool shoes!

Smartie has three default animations for the moods happy, sad and excited. In addition to those animations, you can upload any others (i.e., walking, runnning, excercising) or modify existing ones by connecting Smartie to your Smartphone through Bluetooth or Wi-Fi. For instance, flowers may blossom when you are happy and sun may fall when you are sad.

How are you, really?

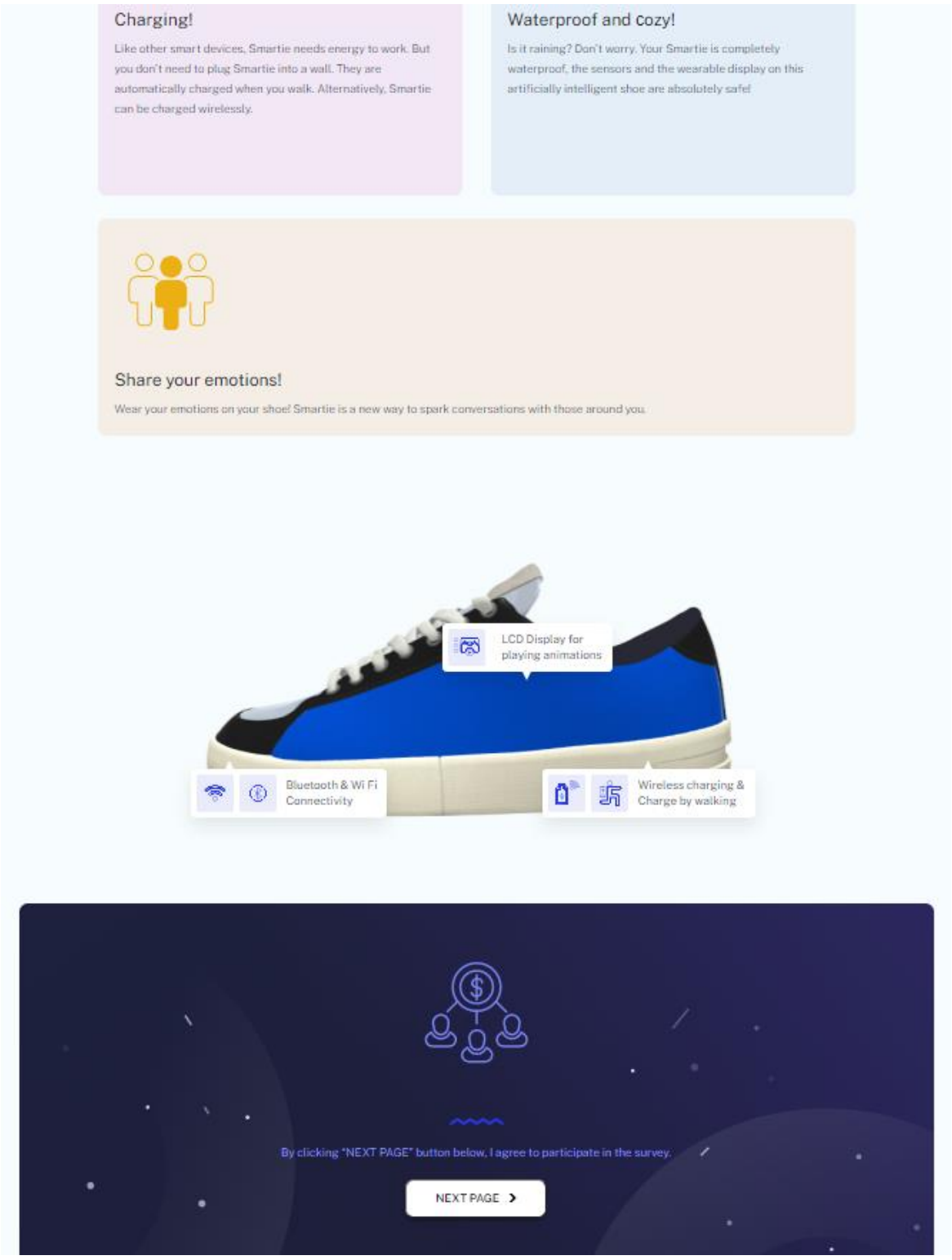
You may already share your mood through social media (Facebook, Instagram, Whatsapp). Now, you can share your mood as it changes in real time by connecting Smartie to your social media profile.

Charging!

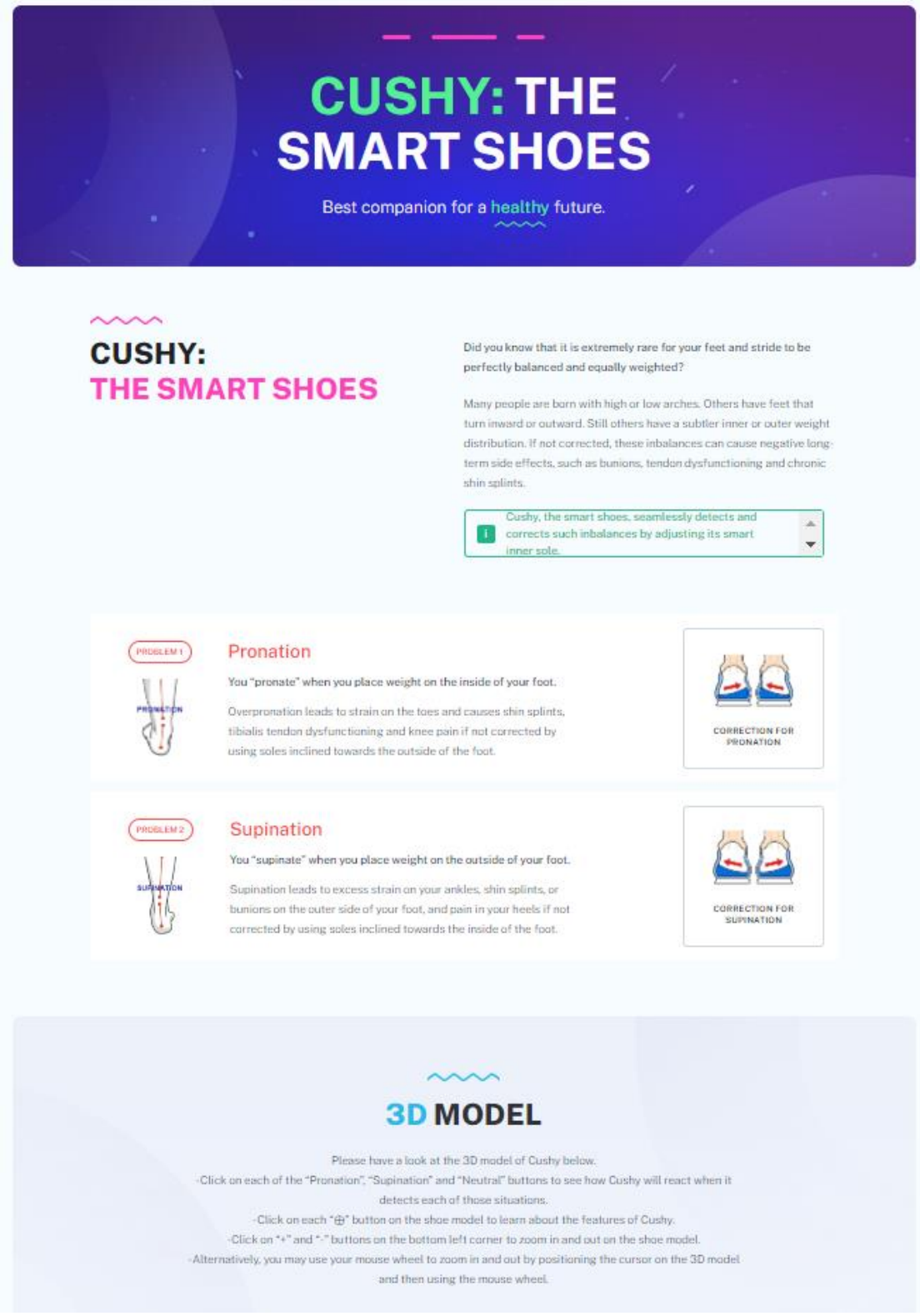
Like other smart devices, Smartie needs energy to work. But you don't need to plug Smartie into a wall. They are

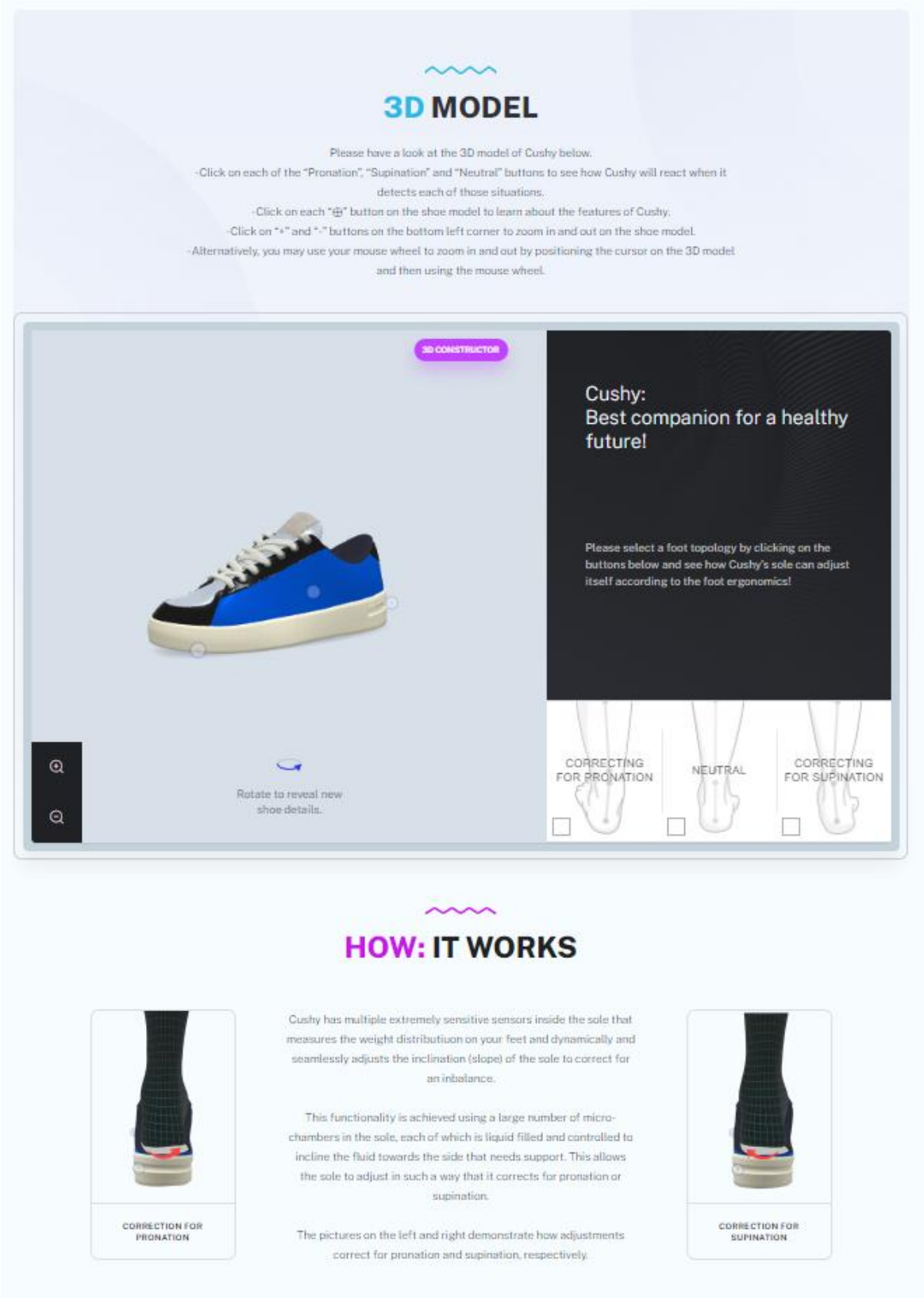
Waterproof and cozy!

Is it raining? Don't worry. Your Smartie is completely waterproof, the sensors and the wearable display on this


Charging!
Like other smart devices, Smartie needs energy to work. But you don't need to plug Smartie into a wall. They are automatically charged when you walk. Alternatively, Smartie can be charged wirelessly.
Waterproof and cozy!
Is it raining? Don't worry. Your Smartie is completely waterproof, the sensors and the wearable display on this artificially intelligent shoe are absolutely safe!
Share your emotions!
Wear your emotions on your shoe! Smartie is a new way to spark conversations with those around you.
LCD Display for playing animations
Bluetooth & Wi Fi Connectivity
Wireless charging & Charge by walking
By clicking "NEXT PAGE" button below, I agree to participate in the survey.
NEXT PAGE

Appendix E: Interactive Utilitarian Product Presentation Web Page




3D MODEL
Please have a look at the 3D model of Cushy below.
-Click on each of the "Pronation", "Supination" and "Neutral" buttons to see how Cushy will react when it detects each of those situations.
-Click on each "⊕" button on the shoe model to learn about the features of Cushy.
-Click on "+" and "-" buttons on the bottom left corner to zoom in and out on the shoe model.
-Alternatively, you may use your mouse wheel to zoom in and out by positioning the cursor on the 3D model and then using the mouse wheel.
3D CONSTRUCTOR
Cushy:
Best companion for a healthy future!
Please select a foot topology by clicking on the buttons below and see how Cushy's sole can adjust itself according to the foot ergonomics!
Rotate to reveal new shoe details.
CORRECTING FOR PRONATION
NEUTRAL
CORRECTING FOR SUPINATION
HOW: IT WORKS
Cushy has multiple extremely sensitive sensors inside the sole that measures the weight distributiuon on your feet and dynamically and seamlessly adjusts the inclination (slope) of the sole to correct for an inbalance.
This functionality is achieved using a large number of micro-chambers in the sole, each of which is liquid filled and controlled to incline the fluid towards the side that needs support. This allows the sole to adjust in such a way that it corrects for pronation or supination.
The pictures on the left and right demonstrate how adjustments correct for pronation and supination, respectively.
CORRECTION FOR PRONATION
CORRECTION FOR SUPINATION

SHOE FEATURES

Learn more about the health of your feet!

The smartphone app connected to Cushy provides trends and analysis of your orthopedic condition. Cushy connects to your phone through Wi fi or Bluetooth. You may inform your healthcare provider about the weight distribution change on your feet for consultation.

No two feet are the same.

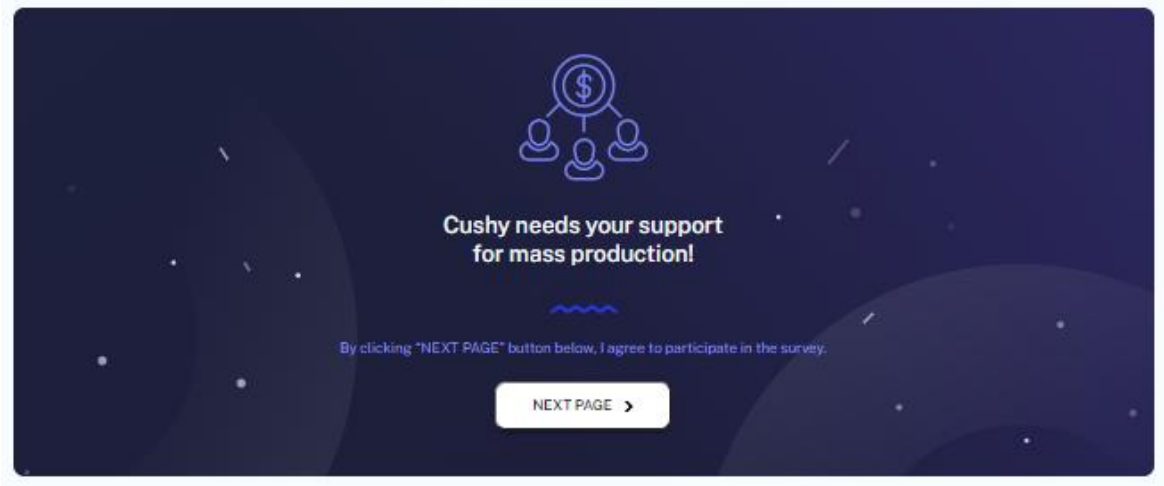
Your right foot may be less pronated than your left, or one foot may be neutral while the other is supinated. Cushy is smart enough to detect these differences and adjust accordingly for each foot. Furthermore, as you wear Cushy, your pronation or supination may improve. As it does, the shoe adjusts accordingly.

Charging!

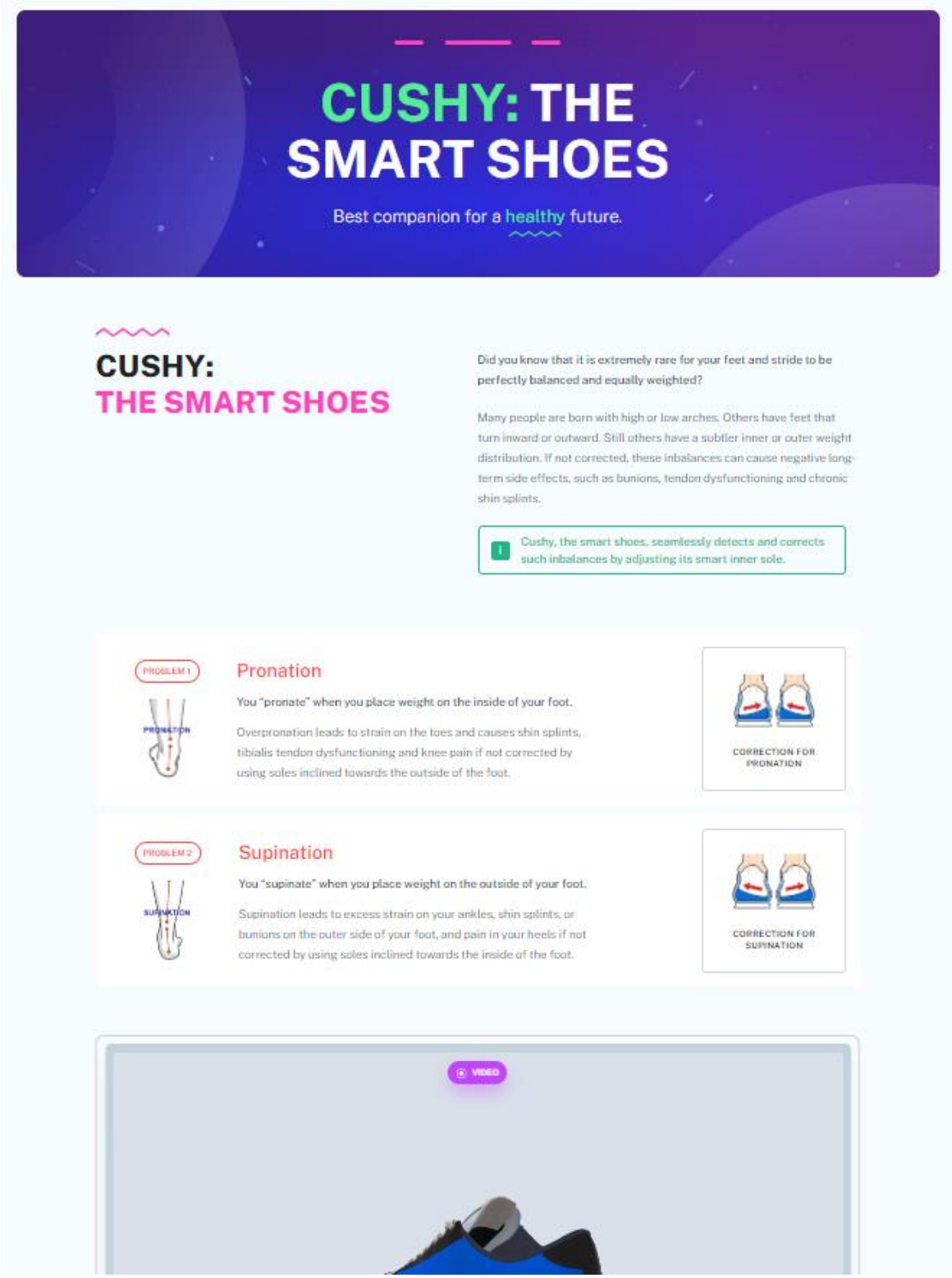
Like other smart devices, Cushy needs energy to work. But you don't need to plug Cushy into a wall. They are automatically charged when you walk. Alternatively, Cushy can be charged wirelessly.

Waterproof and cozy!

Is it raining? Don't worry. Your Cushy is completely waterproof, the sensors and the autonomous sole inside this artificially intelligent shoe are absolutely safe!


Cushy needs your support
for mass production!
By clicking "NEXT PAGE" button below, I agree to participate in the survey.
NEXT PAGE ›

Appendix F: Non-Interactive Utilitarian Product Presentation Web Page



HOW: IT WORKS

CORRECTION FOR PRONATION

Cushy has multiple extremely sensitive sensors inside the sole that measures the weight distributiuon on your feet and dynamically and seamlessly adjusts the inclination (slope) of the sole to correct for an inbalance.

This functionality is achieved using a large number of micro-chambers in the sole, each of which is liquid filled and controlled to incline the fluid towards the side that needs support. This allows the sole to adjust in such a way that it corrects for pronation or supination.

The pictures on the left and right demonstrate how adjustments correct for pronation and supination, respectively.

CORRECTION FOR SUPINATION

SHOE FEATURES

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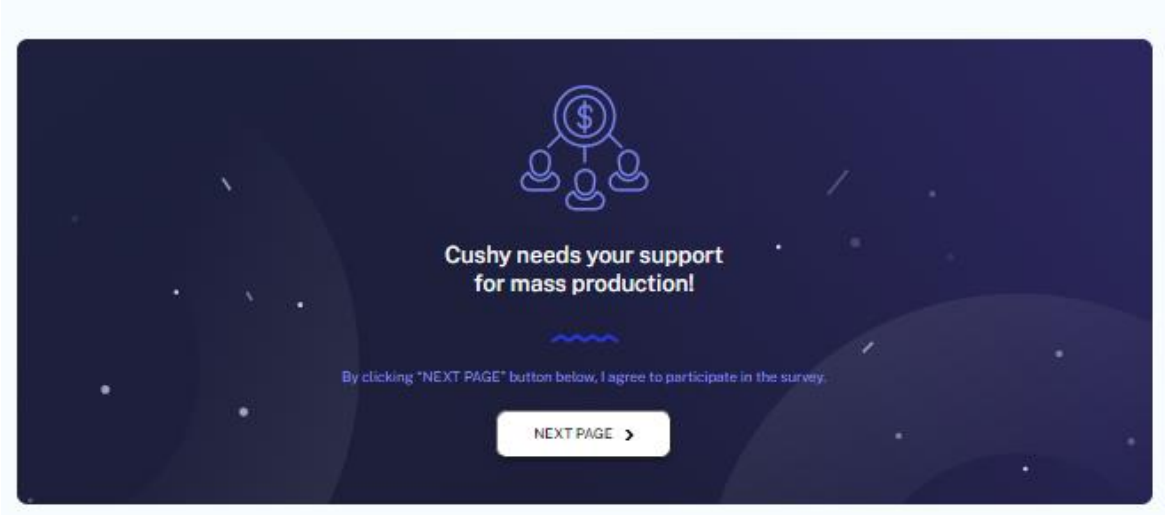
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Appendix G: The Measurement Instruments Adapted from the Extant Literature

Construct	Reference(s)	Adapted Measurement Items
Perceived Interactivity	Yi et al. 2005	To which extent is the product presentation interactive?
		To which extent were you able to interact with this product?
		To which extent was the product presentation responsive to your actions?
Perceived Fit	Hong & Pavlou, 2014	The product matches my requirements.
		The product matches my tastes.
		The product fits my preferences.
		The product is what I am looking for.
		The product attributes (such as color size, texture, style, type, or content (whatever applies)) are what I desire to have.
Perceived Familiarity	Kennedy et al., 2001	In general, would you consider yourself familiar or unfamiliar with the product presented? (very familiar to very unfamiliar)
		Would you consider yourself informed or uninformed about the product presented? (highly informed to not at all informed)
		Would you consider yourself knowledgeable or unknowledgeable about the product presented? (knew a great deal to knew nothing at all)

Perceived Product Innovativeness	Gatignon et al., 2002	Presented product is a major improvement over the previous technology.
		Presented product was based on a revolutionary change in technology.
		Presented product was a breakthrough innovation.
		Presented product were difficult to replace with substitute using older technology.
		Presented product represents a major technological advance.
Product Type Hedonic	Voss et al., 2003	Not fun/fun
		Dull/exciting
		Not delightful/delightful
		Not thrilling/thrilling
		Enjoyable/unenjoyable
Product Type Utilitarian	Voss et al., 2003	Effective/ineffective
		Helpful/unhelpful
		Functional/not functional
		Necessary/unnecessary
		Practical/impractical
Webpage Reliability	McKinney et al., 2002	The webpage seems trustworthy
		The webpage seems accurate

		The webpage seems credible