FLORIDA INTERNATIONAL UNIVERSITY

Miami, Florida

FACTORS OF INNOVATIVE DESIGN THAT LEAD TO LOYALTY FOR

U.S.-BASED MOBILE FOOD DELIVERY APPS

A dissertation submitted in partial fulfillment of

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by

Audrey E. Burke

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To: Dean William G. Hardin
      College of Business

This dissertation, written by Audrey E. Burke and entitled Factors of Innovative Design that Lead to Loyalty for U.S.-Based Mobile Food Delivery Apps having been approved in respect to style and intellectual content, is referred to you for judgment.

We have read this dissertation and recommend that it be approved.

_____
Attila Hertelendy

_____
Chaitali Kapadia

_____
Jayati Sinha

_____
Miguel Aguirre-Urreta, Major Professor

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The dissertation of Audrey E. Burke is approved.

_____
Dean William G. Hardin
College of Business

_____
Andrés G. Gil
Senior Vice President for Research and Economic Development
and Dean of the University Graduate School

Florida International University, 2024

DEDICATION

To my trailblazers, Rebekah, Mary and Olive, my great grand mother, grandmother and loving mother. For your wit, tenacity, humility, strength and faith. You built the bridge so that I could crossover.

I thought I could, so I did!

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ABSTRACT OF THE DISSERTATION

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Professor Miguel Aguirre-Urreta, Major Professor

In the cutthroat realm of last-mile delivery, where businesses race to keep pace with shifting consumer preferences, the rise of network effects-driven models has pioneered a new era of innovation. Mobile food delivery apps are at the forefront of this revolution, fueled by a demand for speed and cost-effectiveness. This research probes into the transformative power of the food delivery app to enhance user experience while improving business performance. Drawing on insights from Bloch (1995) and Sethi et al. (2001), it underscores the pivotal link between design innovation and business outcomes like engagement and loyalty. This research explores four innovative design factors to understand their relationship to engagement and loyalty in 383 mobile delivery app users. Structural equation modeling, using the partial least square method, evaluated findings and provided quantitative evidence that of the innovative design attributes tested, app usability has the most significance to loyalty (b= 0.555, p<.000), underscoring the essential role usability plays in innovation design. Second, is the app's expressive aesthetic (b = 0.410, p < 0.000), design qualities deemed creative or novel, impact engagement, and lead to loyalty. Next, positive emotional value (b =.174, p< 0.001) reinforces that the app's ability

to provide users with a positive emotional encounter during or after use can engender loyalty. The last attribute tested is app appeal (attractiveness); however, it is not supported (b =.035, p <0.554). Therefore, users' feelings (i.e., pleasing and enjoyable) about the app's interface are less critical to design innovation and will produce loyal behaviors toward the app. The personal innovativeness moderating effect (b =.08, p<0.883) does not impact the engagement-to-loyalty relationship. However, personal innovativeness does have a direct and significant relationship to loyalty (b = 0.200, p<0.000). So, the higher the personal innovativeness of the user, the loyalty to the food delivery app is than that of a user with a lower personal innovativeness trait. Engagement is a mediator and a proven antecedent to loyalty (b = 0.222, p< 0.000). Therefore, usability, expressive aesthetics, and emotional value are design attributes that can improve business performance through their impact on engagement and loyalty.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

I: INTRODUCTION

Digital transformation has significantly impacted the logistics and delivery space. The proliferation of competition in the last mile delivery and the speed to innovate to meet changing consumer tastes and behaviors has been explosive and sector changing. Over the last few decades, many delivery start-ups and companies have been able to react quickly to market opportunities by leveraging technology to address changing customer expectations.

Customer preferences for speed and lower delivery costs, along with other contributing factors such as the increasing demand for digital solutions among the younger generation, the need for digital solutions for the aging population, the convenience sought by households, and the accessibility of local options for urban residents, collectively shape the urgency for delivery innovation.

For the delivery provider, the cost of delivery is unlikely to decline substantially, as the economics of last mile delivery remain challenging across sectors, particularly with increasing expectations for speed (typically, 30 minutes or less). For instance, in June 2023, New York City's major declared the app-based restaurant delivery workers' minimum wage should increase from $7.09 without tips to $17.96 per hour without tips and rise to 19.96 by 2025 (NYC.gov).

Expected technological advancements, such as autonomous delivery robots, route optimization, and the ability to batch or "stack" multiple orders per delivery, will likely decrease labor expenses (Ahuja et al., 2021), driving further evolution in both the demand for delivery services and the supporting operational technology. As such, the popularity of

delivery services has led to the development and growth of delivery applications (apps) that take advantage of the mobile services market.

Delivery apps offer a variety of options, including, delivering food from restaurants, packages, groceries, alcohol, and medicine. Delivery services have leveraged the network effect theory to increase their digital footprint. The central concept behind the network effect theory examines if value grows as the network grows and was popularized in early 1990 in the telecommunications field by Robert Metcalfe (Novack, 2023). The network effect theory evolved to have two components: first a direct network effect, a single user group, where adding another user benefits all users equally. Second an indirect network effect, typical of digital platforms, means there is more than a single user group resulting in increased utility for users in one group when there is an increase of users in another group (Parker and Van Alstyne, 2005). For example, in the case of food delivery apps, restaurants are one user group, while the customer who wants their food delivered is the other user group. When restaurants enroll to have a third-party platform to help organize orders, distribute, and provide prepared food, that restaurant has the potential to earn more revenue, gain new customers, and ear customer loyalty, all with less labor. Customers also gain extra utility from the heightened visibility of restaurant offerings, allowing them to place and receive food orders and readily accept offers and promotions.

The focus of this research will be on the mobile food delivery applications, defined as mobile apps used to order food (prepared by a restaurant) from a third-party platform such as Uber Eats or GrubHub, forecasted to grow to $320 billion by 2029 (Ahuja et al., 2021). The industry experienced its most significant growth in five years due to the coronavirus pandemic in 2020 (businessofapps.com, 2023). In the future, the food-delivery

space is poised for further expansion and evolution as the "next normal" takes shape. However, the food delivery space will need to evolve from its growth as a necessity during COVID-19 to finding its place among other dining choices. Restaurants will need to adapt their strategies to think carefully about partnering with delivery platforms and experimenting with new ways of doing business. Also, post-COVID-19, food delivery service providers need to find meaningful ways to retain customers, as some decline in delivery app use has resulted as customers return to in-person gatherings.

As such, an anticipated future increase in the utilization rate of the delivery apps coincides with smartphone users' expectation that the application comprehends and reflects the quality desired of the delivery service (Ahuja et al., 2021). Customer attitudes toward food delivery apps has been an essential theme for some researchers (Cho, Bonn, and Li, 2019), who found that the level of trust, design, and product verity largely shapes perceived value and customer attitudes toward food delivery apps. The research by Alagoz and Heikimoglu (2012) on online food ordering found that factors like usefulness, innovativeness and trust shaped attitudes toward the mobile food delivery apps. Therefore, extant research supports the importance of the apps design in the evaluation of value, perception and even trust. Further, the examination of innovative product design has been shown in research to influence the cognitive and emotional responses that determine user evaluation of the benefits of a new product (Jeon, 2023).

Marketing scholars agree that the term "product" can encompass a wide range of goods and services, both tangible and intangible, all of which undergo design. So, this paper will use "product" and "application (app)" interchangeably. Product design, agreed upon by marketing scholars, can be a competitive advantage and a driver of company

success. Given that success can include performance outcomes like use, retention, and loyalty, the interest in product design has grown significantly among companies, practitioners, and researchers. For mobile food delivery apps in the United States, the market is highly competitive, with low margins, and lacks profitability. Consequently, product (app) design will be a significant strategy by which food service providers can innovate to yield performance success, like customer loyalty. Sony's Chairman Norio Ogha reiterated the weightiness of product design when he said, "At Sony, we assume that all our competitors' products have the same technology, performance, price, and features." However, design is the one thing that can differentiate one product from another (Bloch, 1995).

As such, this study will explore innovative design or design innovation as most referenced in the literature, defined by utilizing the concept of design given by Walsh (1996), new, creative and did not exist before or did not exist in quite the same form**.** The theory of innovative design will be explored for its ability to serve as a defensive strategy in a highly competitive, low margin industry that is performed by using an app, like mobile food delivery apps.

Problem Statement

With today's evolving delivery sector, growing competition, changing consumer preferences, and shifting demand for food delivery services - customer loyalty is harder to obtain. Not only is customer loyalty hard to get, but it is also hard to keep. The food delivery sector joins several providers to make up a highly fragmented and growing ecosystem.

The 2022 valuations of most food delivery apps have declined significantly from 2020. The market sentiment has moved from growth to profitability, and most food delivery apps remained unprofitable throughout the pandemic (Curry, 2023). Food delivery service providers that can scale will remain and have the potential to impact their profitability over the long term (Curry, 2023).

Although app usage is widespread, nearly 80% of users stop using a new app within 90 days (Tian, 2023). This lack of app use is particularly true for food delivery apps; the low barriers to entry and exit fuel this dynamic, causing issues of retention and churn. CleverTap, an app engagement platform, in their industry benchmark article for food delivery apps (2019), reports mobile apps currently account for six out of every ten digital restaurant orders. However, the following statistics indicate the severity of the challenges to keep food delivery app users. Only 22% of new users remain active after the first week, 86 percent stop using an app within two weeks of the first launch, and 54% completely uninstall the app within the first month (CleverTap.com, 2023).

Additional research by CleverTap in 2023 highlights the underperformance of food technology apps compared to other verticals on engagement, 65% engagement compared to 95 percent for fintech. App stickiness is also less for food apps (15%) when compared to verticals like fintech (22%), streaming media (22%), and e-commerce (17%). These numbers suggest that in addition to challenges encountered by all apps, there are specific food delivery app challenges. Extant research has cited design can lead to a distinct competitive advantage. Bloch (1995) writes that the absence of innovation is a primary reason for failure in competitive markets. Poor performance of food delivery apps leads to weaker engagement and a diminished likelihood of continued use. Therefore, food delivery

apps must be designed to drive use and engagement to yield sustainable performance for the food delivery app provider and selection over competitors.

Significance of the Problem

Digital transformation has upended industries, and in the case of the food industry, it has been reinvigorated and transformed. The app's platform, an essential entity to its operation and performance, requires food technology marketers to understand user preferences and how to translate expectations into the app's design and functionality.

The revolutionary impact brought about by food delivery has called for technological advancements in logistics, given rise to local economies impacting restaurants and drivers, and provided marketers with data and analytics to hone customer preferences. The technical achievements have enabled better customer experiences and reshaped customer expectations regarding convenience and selection. Customers boast about available food options, the variety of payment options, and connecting with family/friends through food even when they are in different locations. Customer segments like older adults have found support for independent living choices, and those with accessibility or mobility concerns have found similar independence. While younger customers anticipate ease and speed and have deemed delivery services essential.

The last mile is said to have the most carbon emissions and remains one of the most significant areas for innovation. Subsequently, the support of digital technology in delivery services will continue to evolve, this increasing use of technology will escalate reliance on product design to meet and fulfill customer expectations while also reducing the carbon footprint.

The role of the app and its execution within the food delivery model will remain central to the success and performance of mobile food delivery services. The United States is said to have one of the more complex food-delivery markets, with four active players—DoorDash, Grubhub, Postmates, and Uber Eats—at the top, each commanding specific large urban markets, commissions paid by restaurants and customers, as well as delivery costs (Ahuja et al., 2021).

Ahuja et al. (2021) analysis show an average contribution margin of around 3% or roughly $1.20 on the average order. The presence of multiple players offering a similar service adds to the complexity of this space, forcing companies to find ways to differentiate themselves through marketing efforts such as app experiences, promotions, and prices.

The food-delivery ecosystem requires and will likely reward creativity (Ahuja et al., 2021). Creativity is necessary for all ecosystem areas; however, the delivery platform-the app, can potentially drive enhanced business performance (Ahuja et al., 2021). Moon et al. (2012) wrote that the relationships among marketing, innovation, and design have become increasingly more important. Recognizing and fostering the link between innovation and design can be instrumental in the development of a competitive advantage. With the significance of food delivery apps, providers must continuously examine the design to enhance the app's ability to engage to elicit continued use and loyalty.

Research Gap

Despite the general agreement on the importance of design and innovation, the precise role of design innovation in marketing has yet to receive much attention. Therefore, this paper seeks to add to design innovation research. Most papers that mention design and innovation fail to provide insight into the critical link between design innovation and

marketing outcomes. Thus, this paper seeks to learn how the selected design innovation elements impact engagement and the relationship between engagement and loyalty to inform marketing strategies such as brand management, product development, promotions, and advertising.

Additionally, most extant research has been conducted outside the U.S. in populous countries, culturally very different from the U.S., where there is one dominant food service provider. Conducting research in the U.S. will broaden the body of U.S. based knowledge. The U.S. consumer is also unique, and learning from this audience will help strengthen how customers respond to app design. The study's attention on third-party food delivery providers and how they connect with the customer using their app platform will contribute to mobile food delivery apps as a category. These apps share similar characteristics, so research findings are highly focused and topical. Thereby, affording applicable understanding across mobile food delivery providers.

Finally, this research centers on post-adoption, a less frequent focus, given that most established research models stem from the technology acceptance model (TAM) and emphasize technology adoption or the intention to adopt a technology-centric approach.

In turn, this study will be from the customer's perspective and, as such, aims to add to the literature on app design, marketing, and product development to provide new insights on post-adoption perspectives on design attributes and their impact on engagement behavior and loyalty.

Research Question

What factors of innovative app design lead to loyalty for U.S.-based mobile food delivery services?

Research Contribution

Overall, the study will inform developers, marketers, and academia about innovative app design for continued app usage leading to loyalty and enhanced business performance. Once the relationship of innovative app design attributes to engagement and loyalty is determined, marketers and product/app developers can respond by delivering experiences in distinctive ways that benefit their brands and offer a defense to the competition. The findings will also be insightful to user experience professionals as it adds to under-researched innovative app design, an increasingly important area of user experience research. Notably, the study will reflect the voice of customers. Although design dimensions are like ones used in seminal papers such as Moon et al. (2012) which included aesthetics, features, and emotional attributes, the constructs included in this paper have characteristics that seeks to broaden knowledge within the dimensions while connecting all the design attributes to marketing outcomes like engagement and loyalty. This research will connect the post technology adoption with design attributes to understand which influence continued use leading to loyal behavior.

II: BACKGROUND LITERATURE REVIEW AND THEORY

Several theories and concepts contribute to the development of this research study. The study is multi-disciplined and multi-dimensional as it tackles technology, design, and marketing. As such, the inclusion of several foundational theories and concepts are significant in building knowledge and drawing hypotheses. To begin, the foremost theories are Design Innovation and the Stimuli-Organism-Response Theory

Design Innovation

Design and innovation are concepts on the minds of many leaders as they foster opportunities to create and distinguish a company from the competition. The significance that these two concepts have gained individually is worth noting and is a fundamental driver of the attributes selected in this analysis.

Marketing emphasizes the significance of product design; Borja de Mozota (2002) suggested that product design can establish brand recognition and enhance firm value. Ravasi and Lojacono (2005) highlighted the role of design, noting that producers of both traditional and high-tech consumer durables attain a competitive advantage through product design.

Discussions on how to define design often originate from the idea of innovation. Walsh (1996, p. 513) wrote, "Design is the idea to provide the instructions for making something that did not exist before or not in quite that form." According to Crawford and Di Benedetto (2007), design is "the synthesis of technology and human needs into manufacturing a product." Yet, before Crawford and Di Benedetto's definition, Freeman (1983) asserted that design plays a crucial role in innovation since it is the domain of

creativity where ideas develop. It also plays a vital role in bridging technical possibilities with market demand.

Joseph Schumpeter offered one of the first definitions of innovation in the 1930s. He defined five types of innovation: the introduction of a new product or a qualitative change in an existing product; process innovation that is new to the industry; the opening of a new market; development of a new source of supply for raw materials or other inputs and changes in industrial organization (Schumpeter, 1930). The Oslo manual, produced by the Organization for Economic Co-operation and Development (OECD), based its definition on the first type of innovation identified by Schumpeter, suggesting that technological product innovation involves a new or improved product whose characteristics differ significantly from previous products (OCED, 1997).

Hauser et al. (2006) wrote that innovation was necessary for firms to succeed and defined innovation as bringing new products and services to a target audience. Moon et al. (2012), were one of the few researchers who attempted to combine design and innovation. As such, Moon forms design innovation conceived by Walsh (1996), Freeman (1983), and Aubert (1982): new, creative, and did not exist before or did not exist in the same form. The innovation concept developed by Schumpeter and OECD (1997) added to this: new and improved. Crawford and Di Benedetto (2007) saw an additional link between innovation and design and introduced customer needs. They defined design as "the synthesis of technology and human needs in manufacturing products." Hauser and his colleagues (2006) noted that successful innovation relies on first understanding customer needs and then satisfying those needs through development. Therefore, for defining design innovation, this study will use Moon et al. (2012) definition; design innovation is a new or

substantially improved product design and Hauser's (2006) addition of product features created to satisfy customer needs.

Moon et al. (2012) conceptualized a three-part framework for product design innovation: aesthetic, feature, and emotional attributes. Moon's framework will inform the model used in this research and guide the inclusion of design variables chosen for this study. First, aesthetic qualities focus on product design; in their 2009 study, Seva and Helander examined how mobile phones' specific aesthetic and functional characteristics affect consumer behavior. They discovered a connection between aesthetic qualities and product form (Seva and Helander, 2009). Liu (2003) asserted that a product's aesthetics impact its market share, meaning its aesthetic qualities are closely related to customer needs. Second, feature attributes focus on specific features and functionality. Roy and Riedel (1997) studied the role of design. They suggested that the design of a product or its essential elements deliver benefits, such as improved ease of use, primary technical performance, and enhanced function to the customer. Thereby, concluding features lead functions, which means features permit certain functions to create benefits in the operation process (Crawford and Di Benedetto, 2007). Lastly, emotional attributes focus on how customers feel when they purchase or use the product. Mokarian (2007) cites that the more a product design satisfies the emotional needs of consumers, the more it will generate consumer interest in purchasing the product (Mokarian, 2007).

Design Innovation Attributes

The following section will define the variables (attributes) selected to learn about design innovation and its relationship to engagement and customer loyalty. This research asserts that design innovation will have the following dimensions: expressive aesthetics, app appeal(attractiveness), usability, and emotional value.

Expressive Aesthetics

Aesthetics encompass a multidimensional attribute, including classical aesthetics conveyed through terms like "well-organized," "clear," and "clean. In contrast, expressive aesthetics involves the designer's capacity for expression, demonstrating creativity and originality. Words such as "original," "creative," "fascinating," and "sophisticated" (Lavie et al., 2004) describe expressive aesthetics.

Seva and Helander (2009) found that aesthetic attributes are related to product form, and Liu (2003) argued that the aesthetics of a product influence its market share, meaning that aesthetic characteristics of a product are critically related to customer needs.

Researchers found aesthetics essential in new product development, marketing strategies, and the retail environment (Russell and Pratt, 1980; Russell, 1988; Kotler and Rath, 1984; Whitney, 1988). Bloch (1995) concluded that a product's "physical form or design is an unquestioned determinant of its marketplace success." Alternately, Jennings (2000) surmised that aesthetic experiences are intrinsically motivating, require focused attention, stimulate curiosity, and are interesting. In conclusion, aesthetics has both external and intrinsic properties making it an essential component of our research inquiry. For this study, our focus will be on expressive aesthetics only, chosen to address whether novelty and originality have a causal relationship to engagement and loyal behavior.

Extant research by Sanchez-Franco and Roldán shows that expressive aesthetics will improve community integration and active participation. Users will be more likely to engage in aesthetic and stimulating interactions and choose to avoid those that are not establishing and fostering enduring interactions and, consequently, loyal behaviors. (Sanchez-Franco and Roldán, 2010), In Sanchez-Franco and Roldán's (2010) work, they hypothesized that expressive aesthetics (and other affective cues) would become relevant drivers between a social network site (SNS). The research supported that an expressively aesthetic SNS could move users from an under-exposed and uninterested state into one that often results in lifelong involvement and appreciation. The results demonstrate that expressive aesthetics significantly predicts a perceived commitment to a social site, leading to this inference's application to customer support/loyalty.

App Appeal (Attractiveness)

Joen (2023) wrote that attractiveness positively influences all decision process stages: need, information search, alternative evaluation, purchase, and post-purchase. The use of beautifully designed products may provide sensory pleasure and stimulation. In contrast, objects with unattractive forms may not (Bloch,1995). An attractive user interface (UI) design is known as a powerful tool for grabbing users' attention, supporting interaction, and creating immersive and compelling experiences (Fang et.al, 2017).

Prior research also reports that having a visually appealing UI is important for a user's interaction experience and their level of psychological engagement (Santosa et al., 2005), and a lack of UI attractiveness can deter the willingness to engage in the interaction (Brangier & Desmarais, 2013). Further, because of the attractive interface design, users' sensory and cognitive curiosities increase (Peters et al., 2016), which may increase the

chance of users devoting time, effort, and energy to use the app. Similarly, when customers choose between two products, equal in price and function, they buy the one they consider more attractive (Bloch, 1995).

Several studies in the literature examine the impact of visual attractiveness on ease of use and usefulness of a system (Ghapanchi et., 2020). Van der Heijden's (2003) study shows that visual attractiveness positively influences perceived ease of use and usefulness. However, there is limited literature on attractiveness, and in previous research, attractiveness falls under other constructs, such as aesthetics, visuals, or appearance. Joen (2023), in his study, uses attractiveness to discuss innovative design; he interprets attractiveness as how the app makes the user feel. Jeon's 2023 interpretation is adopted here and applied to the discussion of how innovative design attributes impact loyalty. This construct is also chosen to offer a construct that will not compete or replicate an aesthetic-focused variable. Consequently, enhancing knowledge about this construct and its relevance to building engagement and loyalty

Emotional Value

Perceived value is the usefulness of something that satisfies needs (Bonhomme et al., 2010). Similarly, Zeithaml (1988, p.4) defines value as "the consumer's overall assessment of the utility of a product based on perceptions of what is received and offered." These definitions align with the theory of utility, which assumes that individuals perceive value as the difference between the utility and the cost reflected by the price paid for the product and services (Tellis & Gaeth, 1990). Subsequently, other researchers criticized these definitions (Lee et al. 2011; Babin et al. 1994; Holbrook 1994) due to their focus on one side of value (i.e., functional value). These researchers argued that functional value did

not capture the emotional dimension. They suggested that value is a multidimensional construct that consists of emotional and functional dimensions and that emotional value is vital in motivating customer attitude and behavior. Still, an alternate perspective proposed three value dimensions, i.e., extrinsic, intrinsic, and systemic value (Hartman,1973). Extrinsic value refers to the functional side, whereas intrinsic value reflects the emotional aspect of consumption. Conversely, the systemic value represents the rational aspect. Instead, Sheth et al. (1991) postulated five consumption values: functional, social, emotional, epistemic, and conditional. Later studies omit epistemic and conditional values because they are too transient (Sweeney et al. 1996).

Based on these discussions, this study conceptualizes value as a multidimensional construct that consists of two dimensions, i.e., functional and emotional values. This research will address the functional value quality by including the usability variable. While the emotional value will be discussed directly using the emotional value variable.

Emotional value is associated with a service experience's affective states (Sweeney & Soutar, 2001; Zainuddin et al., 2011). These can be both positive affective states (enjoyment, happiness, and entertainment) or negative (e.g., fear, anxiety, and distress) (Zainuddin et al., 2011). Emotional value exhibits positive feelings about the brand and product that motivate purchase (Bendixen et al., 2004). Mainly, it refers to the amount of pleasure consumers experience from their consumption (Bonhomme et al., 2010).

Desmet (2007) writes that emotions are functional because they establish our position vis-à-vis our environment, pulling us toward certain people, objects, actions, and ideas and pushing us away from others. This fundamental principle applies to all emotions; the intense emotion one may experience in a situation that threatens basic survival needs

and the subtle feeling one may encounter in response to human-product interaction. Pleasant emotions pull us to products that are (or promise to be) beneficial, whereas unpleasant emotions will push us from those that are (or promise to be) detrimental to our well-being (Desmet, 2002).

Emotions are an essential consideration for social behaviors (Parkinson et al., 2018), and research on customer-perceived value also suggests emotional value is a consistently significant driver of desired outcomes compared to other value dimensions.

In conclusion, this work will focus on positive emotional value, as positive emotional value encourages users to approach and increases the likelihood for higher levels of engagement, to result in loyalty.

Usability

Notably, higher usable devices have a greater return on investment (Marcus, 2005), and the application of user-centered design in the development of mobile applications is one crucial way to increase this usability (Kangas & Kinnunen, 2005). Consequently, researchers, developers, and marketers alike have developed an interest in the evolution of usability and its overall impact on the app and business performance. Researchers are working to define constructs and accurately measure relationships, and organizations with apps want to optimize their offerings and deliver the best user experience possible. Although usability is a well-studied area, there have been limitations found in previous research, including a focus on hardware or software characteristics, predominately lab-based studies, and vague measures (Weichbroth, 2020). The definition of usability has also been a source of discussion amongst researchers.

Weichbroth's (2020) study summarizes the evolution of the definition of usability this way. In 1991 the Organization for Standardization (ISO), in response to the emergence of the need of the software community to standardize some facets of software products, publicized the 9126 standards, which defines usability as "a set of attributes of software which bear on the effort needed for use, and on an individual assessment of such use, by a stated or implied set of users." In 1998 ISO revised the definition to state usability is "the extent to which specified users can use a product to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use."

The latest definition in ISO/IEC 25010, which replaced the ISO/IEC 9126 standard from 2001, specifies usability as the degree to which determined users can use a product or system to achieve defined goals with effectiveness, efficiency, and satisfaction in a specified context of use. The second and last definitions share some commonalities in effectiveness, efficiency, and satisfaction.

In Ray et al. (2019) study, conducted in India to understand the use of food delivery apps, the authors analyze the association between ease of use and usage intention. However, just one component of usability, ease of use, is examined. The study is noteworthy for its contextual alignment. Further, the study results support the hypothesis, which agrees with prior literature finds that customers value ease of use, is positively associated with intentions to use food delivery apps (Ray et al., 2019). For this study, usability focuses on the functional performance of the app and includes ease of use and practical effectiveness for the context of use. Thereby, usability concludes the design innovation attributes discussed in this work.

Stimulus-Organism-Response Theory

The S-O-R model is the second foundational theory for this work, developed by Mehrabian and Russell (1974) and a seminal model of the impact of the environment on customer behavioral intentions (Tak and Gupta, 2021). This model assumes that people's reactions to the physical environment follow three components: environmental stimuli, emotional state, and behavioral response (Taki and Gupta, 2021).

The S-O-R model: the S represents the stimulus defined as those factors that affect the individual's internal state (Eroglu et al.,2001). The O is for an organism and refers to the internal processes and structures between external stimuli and a person's final actions, reactions, or responses (Chang et al., 2011). Lastly, R refers to the term response to consumers' ultimate outcomes and choices, either approach or avoidance behaviors (Elsotouhy et al., 2024). The fields of information systems, e-commerce, retail, hospitality, and tourism have used the S-O-R model to support attributes that users interact with and can be considered stimuli that can, in turn, influence behaviors such as purchase intentions, repurchase, and loyalty (Fang et al., 2017). However, until now, researchers have yet to apply the S-O-R model in smartphone application research widely. Based on preceding studies and Ali et al. (2021) work, the S-O-R model was used in a smartphone app context to comprehend better the influence of several app attributes (service, information, and system quality) on users' engagement with health and fitness apps (stimuli), resulting in stickiness intention and word-of-mouth (response). Hence, this research will use the parsimonious framework of the S-O-R model to support its foundational premise that design attributes, consisting of aesthetics, app appeal, emotional value and usability

(stimuli) will interact with the user (organism) thereby causing a corresponding action like loyalty toward the food delivery app (response).

To conclude the discussion on theories an overview of other supportive theories is discussed to assist in providing context and further guidance as it pertains to the research model design.

Engagement/User Engagement

As a concept, engagement has drawn considerable attention in several research fields, such as social psychology, organizational behavior, marketing, service management, and information systems. Although it is the consensus that consumer engagement is associated with loyalty, satisfaction, word-of-mouth, and sales volume (e.g., Cheung et al., 2015, Kim et al., 2013, Oh et al., 2017), the term "engagement" has generated a tremendous amount of debate and disagreement on the definition, dimensionality, and operationalization. The interpretation of customer engagement is still full of vagueness and controversy (Cheung et al., 2015). Despite the different conceptualizations, there are three main perspectives from which researchers have investigated customer engagement (Cheung et al., 2015), i.e., the psychological process (Bowden, 2009), the behavioral manifestation (Van Doorn et al., 2010), and the motivational psychological state (Fang et al., 2017). Specifically, from the psychological process perspective, researchers regard engagement as a psychological process that leads to a customer 's return and loyalty (Bowden, 2009). As such, the psychological process could combine the motivational psychological state and behavioral manifestation perspectives.

This study focuses on behavioral engagement as users' continued interaction with a mobile food delivery app. This chosen focus is consistent with most extant research on

user behavioral engagement (Kim et al., 2013, Verhagen et al., 2015). Even though there is a conceptual distinction, behavioral engagement intention, and actual engagement behavior are said to be closely related (Kim et al., 2013, Jiaming et al., 2017). Jiaming et al. (2017) also found that app design, user interface attractiveness, and compatibility are the most salient app attributes stimulating engagement.

The following discussion on user engagement is included to highlight user experience, given its significance in the app experience. As such, user engagement (UE) interests' researchers from various disciplines and has applications in diverse settings, from gamers to employees. Engagement is the sought-after outcome for designers and developers alike; lacking engagement can diminish the efficiency and meaningfulness of interaction between users and technologies (Goethe et al., 2019). Like user experience, the boundaries defining user engagement are still evolving, leading to different questions about its conception, abstraction, and measurement (Goethe et al., 2019). For example, Laurel (1993), Webster and Ho (1997) describe engagement as a cognitive state, while Sutcliffe (2016) refers to engagement as an interaction with behavior as a basis.

Extant research on engagement has shown specific domains with user groups and applications, with little or no attempt to generalize beyond the individual work and no theoretical underpinnings (O'Brien and Toms, 2008). However, the exception came with Chapman and his colleagues (Chapman, 1997; Chapman et al.,1999), who related engagement to Flow Theory. Flow Theory comes from Mihaly Csikszentmihalyi, a positive psychologist, who described flow as a state where people are involved in an activity that nothing else seems to matter, so enjoyable that people do it even at a high cost. flow shares the following attributes with engagement: focused attention, feedback, control,

interactivity, and intrinsic motivation (Csikszentmihalyi, 1990). Both UE and flow have a fundamental relationship between attention, interest, and affect. Still, the presence of negative and positive affect may distinguish these two types of experiences. While flow is a delightful experience, UE may encompass various emotions. O'Brien (2008) further hypothesized that UE and flow are two states on the same continuum of subjective experience, where UE is needed for flow, but flow is not required for UE. The engaged user may or may not enter a flow state before disconnecting from technology. O'Brien (2008) proposes differences in flow and engagement can come from the non-voluntary use of a system. Further, flow requires sustained, long-term focus, while engagement can occur while multitasking and in dynamic computer environments. Flow theory applies to human-computer interaction (HCI) and user engagement. This engagement became known as "a subset of flow," "flow in a passive state," and "flow without control" (O'Brien et al., 2005). In summary, flow and positive psychology's impact on UE research is evident and far-reaching. In addition to Flow Theory, other theories emerged, like Aesthetic Theory (Beardsley, 1982), Play Theory (Stephenson, 1967), and Information Interaction Theory (Toms, 2002).

Aesthetics is the visual appearance of the interface as it confirms design principles (i.e., symmetry, balance, emphasis, and harmony; Beardsley, 1982). Aesthetic experiences are said to be intrinsically motivating, require focus and stimulate curiosity and are interesting and pleasurable (Jennings, 2000), similar qualities to engagement. Characteristics of aesthetics find a connection to usability and users' skills and needs, as well as part of the sensory format of the application (Overbeeke et al., 2003). As a result, aesthetics is deemed essential to engagement (O'Brien, 2008).

Play is the physical activity that encourages learning and creativity, develops and satisfies psychological and social needs, and involves aspects of competition and collaboration (Rieber, 1996). Play has increasingly been associated with the frequency and satisfaction of system use (Atkinson &Kydd, 1997) and has been attributed to increased motivation, challenge, and affect (Woszcyzynski et al., 2002). As such, play is a critical element of engagement.

Lastly, interaction refers to the communication between the user and the computer interface (Schneiderman, 1997). The interface represents how the data is categorized, presented, and made meaningful to the user. For users, information interaction refers to the process individuals use to interact with the content of a system (Toms, 2002, p. 855). For the user, the interaction occurs with a sequence of activities when using the system and is contingent on the user's attributes, system, and environment. (O'Brien & Toms, 2008). It is, therefore, the interaction between the user and the system that facilitates an engaging experience.

As outlined, the theoretical framework that informs engagement is holistic and multi-faceted and considers aspects like flow, play and aesthetics with the integration of use and system variables to promote pleasurable and memorable experiences. This multi-faceted perspective makes engagement dynamic and multidisciplinary which must be acknowledged in the design process.

Gestalt Theory

The founders of Gestalt psychology Max Wertheimer (1880-1943), Kurt Koffka (1886-1941), and Wolfgang Kohler (1887-1967), all worked to devise theories of human visual perception and understanding based on earlier works by Ehrenfels (1859-1932)

and others. Ehrenfels, in his publication Üeber Gestalt qualitäten (1890) which translated means more than the qualities of the whole form. Ehrenfels described the concept as a melody that, even when played in different keys, is still recognizable and is not simply the sum of its independent notes but a synergistic 'whole effect.'

A primary area of focus for gestalt psychologists was the factors that influence the interface between human perception and the visual field. They determined that visual perception involves a complex and interrelated process wherein the perception of external stimuli occurs in tandem with neural processing. It consists of a search for similar patterns and shapes suitable to represent perceptual-neural universals. Gestalt psychologists went on to develop a set of principles (laws) such as the law of good figure (easy to perceive as a whole); the law of proximity (shape, objects designed together as a group); the law of similarity (we tend to group shapes/objects/elements that share similar color/tone/texture/shape, etc.); the law of good continuation; the law of common fate and the law of closure.

Gestalt theory is about interpretation and how we put things together in our minds. This theory focuses on what is perceived (O'Conner, 2015). As such, the Gestalt theory is acknowledged in this study to help explain the context for app evaluation. The theory clarifies which level product design will be measured: rather than the atomistic level used to measure the design elements such as color and shape, a holistic level is chosen to measure the app's design through its interface and consumers' general perception of it.

User Experience

Inspired by ergonomics, user experience design sought to establish fixed rules to make people's jobs easier and more effective. Based on his studies of the interactions

24

between workers and the tools they use, Mr. Winslow Taylor created the modern optimization of the work process in 1900. This was likely the first instance of organized UX research in human history. Toyota popularized human-centered production in the 1940s to increase productivity by creating a comfortable and easy-to-work-in environment for employees. Toyota also put the user at the center of user experience design. The first theoretical computer created by Alan Turing in the early 1940s led to significant advancements on the product side of user experience design. The theory of computation is the primary driver of computer science's exponential growth.

An industrial designer, Henry Dreyfuss, wrote "Designing for People," which discussed the relationship between people, their experiences, and successful product design. This article is considered one of the best contributions to developing user experience design.

In the 1970s, the personal computer era began. The idea behind the graphical user interface (GUI) and the computer came from a facility in Silicon Valley called Xerox Parc. They were responsible for designing the computer mouse and the GUI concept, along with engineers and psychologists, who collaborated to create the ideal experience. Apple and Microsoft used the Xerox Parc work process to create their incredible computer systems. Finally, cognitive psychologist and designer Don Norman coined the term "User Experience" (UX) in 1995 to describe the diverse tasks his team was working on at Apple Computers.

Today, the term "UX" can mean many different things, resulting in a lack of consistent frameworks. At its core, UX is a combination of complex, dynamic, situated, and subjective ideas (Henna, 2022). It results from the user's internal state (motivation,

mood, expectations, etc.), the system's characteristics (usability, functionality, etc.), and the environment in which the interaction takes place, such as an organizational or social setting and voluntariness of use (Hassenzahl and Tractinsky 2006). UX affects how the product functions when a user interacts with it (Garrett, 2011) and how the user feels when using it (Sáenz-de-Urturi et al., 2015). According to Zahidi, Lim, and Woods (2014), the UX elements that impact user satisfaction are visual design, an engaging presentation of the content, current and reliable content, an immersive experience, simple and clear navigation, and responsive design. Consider your favorite food delivery app UX consists of the user's step-by-step interactions with selecting the restaurant, menu items, any customization, and accepted discounts and ordering it from the app, the picking up experience from the restaurant, and the delivery to the user's destination. In other words, both online and offline experiences.

This study will focus on the online experience exclusively. However, based on the comprehensive nature of the user experience theory, it will serve as a critical theory to accommodate how design constructs under review in this study impact customer behavior.

Personal Innovativeness (PI) As a Moderator

Beginning with Rogers (1995) Innovation Diffusion Theory, he asserted that information about innovations circulates through social systems where there are potential adopters. The theory categorizes individuals into segments based on when individuals adopt an innovation: innovators, early adopters, majority adopters, late adopters, and laggards. Adopters process information to create perceptions about the innovation's characteristics, and these perceptions—along with other contextual factors—then serve as the basis for decisions about how to adopt innovations. Since Rogers, other technology

26

models have been extending his work or drawing from new models such as TAM (1986) and Reasoned Action Theory (Azjen and Fishbein, 1980). Despite some differences in hypothesized relationships, these acceptance models share a few critical similarities regarding their construct saliency. Two shared recurring constructs in these models are perceptions about the innovation's characteristics and user intentions regarding innovation. Intentions are a direct and significant predictor of actual usage behavior.

Building upon Rogers' theory, Agarwal and Prasad (1998) focus on some of the problems identified in the Innovation Diffusion Theory operating in differing technology acceptance realms and change the focus from observed adoption behavior to an underlying personal trait. Agarwal & Prashad, 1998 recommend that introducing individual difference variables, like personal innovativeness, when it comes to information technology would help researchers understand the formation of perceptions and usage intentions. With this, Agarwal and Prasad (1998, p.206) define personal innovativeness "as an important individual trait for examining the acceptance of information technology innovations."

The three-tier hierarchy of traits defined broadly by their role's breadth is generally accepted by academics working in personality research (Mowen and Spears, 1999; Ah, 1989). According to Paunonen (1998), the tiers are the cardinal, central, and secondary levels. Cardinal traits give a broad picture of the master qualities of the person that serve as the basis for behavior. The interactions between cardinal traits and context (IT) are known as central traits, referred to as being one step closer to manifest behavior (Davis and Yi, 2012). The interactions between traits at the central level and the immediate IT context primarily shape traits at the secondary level that exhibit consistent but malleable responses over time (Mowen and Spears, 1999). Lastly, IT-specific traits (i.e., Personality

innovativeness information technology or PIIT) sit at the bottom of the hierarchy occupying the secondary level with specific trait breadth, a reflection of the characteristic behaviors of the traits at the various levels (Borkenau and Müller, 1991). Rogers and Shoemaker (1971) and Rogers (1995) conceptualize this construct in terms of its operational definition, i.e., individuals are characterized as "innovative" if they are early to adopt an innovation. Hence, segmenting the population into innovators and non-innovators and operationalizing at the time of adoption.

Personal Innovativeness (PI) has not been without its critics, Midgley and Dowling (1978), and subsequently, Flynn and Goldsmith (1993) argue that PI is a hypothetical construct. Its definition, and its measurement as an observable phenomenon (i.e., time of adoption), obscures the true abstract definition of the concept. Another critique is that innovativeness is only assessed after the decision to adopt the innovation has been made, which prevents prediction and subsequent management intervention. Additionally, while innovativeness has drawn attention as a factor in innovation adoption behavior, marketing researchers have noted that it is crucial to conceptually and practically distinguish between global innovativeness and domain-specific innovativeness (Flynn and Goldsmith 1993).

Global innovativeness hypothesized that every individual possesses global innovativeness to a greater or lesser extent, Hurt et al. (1977). Global innovation, however, has low predictive power when applied to any specific innovation adoption decision (Goldsmith and Hofacker 1991; Leonard-Barton and Deschamps 1988). Alternately, domain-specific innovativeness is posited to significantly impact behaviors within a specific domain of activity (Goldsmith and Hofacker, 1991) and can be measured directly by self-report (Flynn and Goldsmith, 1993).

Agarwal and Prashad, 1998 contended that PI is a crucial concept for analyzing the acceptance of innovations in information technology, which is consistent with the emphasis of PI in the marketing literature. Although PI has not been considered in any of the most widely used models of technology acceptance even though other disciplines have provided significant theoretical and empirical support for its significance as a driving factor in the uptake of innovations (Agarwal and Prashad, 1998).

This research will focus on domain specific PIIT, defined as "the willingness of an individual to try new information technology (Midgley and Dowling (1987) and Flynn and Goldsmith (1993). Personal innovativeness as a construct is important to the study of individual behavior toward innovations and has had a long-standing tradition in innovation diffusion research (Rogers,1983, 1995) and particularly in the marketing domain (Agarwal & Prashad, 1998). As a moderator of the consequences of perceptions, PIIT epitomizes risk-taking behavior. Kirton (1976) notes that innovation, by its very nature, is associated with greater risk, uncertainty, and imprecision.
Rogers (1995) characterizes that innovators and early adopters can cope with higher levels of uncertainty.

Extant research concludes that an innovative user may weigh expressive aesthetics in design more heavily due to its direct affiliation to stimulating and original experiences. Bhattacherjee et al. (2012) also found people who are highly innovative and enjoy trying out a new product/service are more prone to switching between information systems.
Based on the former discussion, PI is seen as instrumental to user perception, intentions and behavior which can result in more loyal or less loyal tendencies toward a product. Since the evaluation post-adopted apps, the aim is to learn if the trait will have impact on

engagement driven by the employment of innovative attributes and do they influence engagement leading to sustained use thereby forging loyal users. Consequently, PI will be used in much the same way as Agarwal and Prasad described as a personal trait.

Loyalty (Continuous Use) – Dependent Variable

Due to the proliferation of technology and applications, there is a rising need in Information Systems (IS) research to take a closer look at post-adoption Information Technology (IT) use (Jasperson et al., 2005). Most literature studies focus on using or adopting technology (Venkatesh et al., 2003) and assumed that use constitutes a monolithic construct that translates into positive impacts (Turel et al., 2011). However, recent research shows that the use construct is much more complex. For example, use can be habitual (e.g., Jung, 2014; Limayem et al., 2007), effective (Burton-Jones & Grange, 2012), or adaptive (Bagayogo et al., 2014). Alternately, use can also imply misuse (Marakas & Hornik, 1996); Jung, 2014; Limayem et al., 2007), effective (Burton-Jones & Grange, 2012), or adaptive addiction (Turel et al., 2011b; Vaghefi et al., 2017), or deliberate errors (e.g., Ferneley & Sobreperez, 2006). Some studies also attempt to describe IT use from the perspective of the features employed to perform tasks, including emergent use, deep use, and feature extensions (Jasperson et al., 2005; Saga & Zmud, 1994; Wang & Butler, 2006). Initially, this research explored these different types of use to evaluate newer points of view on use. However, after further examination, it is surmised that app owners and associated businesses are mainly interested in the continued use of the app to perform a delivery service. This research continues this notion of returning use and found constructs like continuous use intention, described as consumers' use of apps to make purchases in the future (H.-Y. Kim et al., 2015). Lederer et al. (2000) accounted for actual behavior through

the frequency of usage in the context of website acceptance and use. Venkatesh et al. (2012) represented actual behavior for mobile internet by frequency of use. Wang's (2008) study employs 'intention to reuse' to measure e-commerce systems' success to simplify the closed-loop relationships between use, satisfaction, and intention to use. The construct of intention to reuse is conceptually like customer loyalty used extensively in marketing. As such, this study chose to adopt the marketing concept (loyalty) to evaluate future continued use.

Oliver (1999) defines customer loyalty as a deeply held commitment to repurchase or repatronize a preferred product/service consistently in the future, thereby causing repetitive same-brand or same-brand-set purchasing, despite situational influences and marketing efforts having the potential to cause switching behavior. Subsequently, Ribbink et al. (2004) stated that this general definition applies to online. Harary (1962) measured loyalty by the probability of product repurchase. Other researchers (e.g., Day, 1969; Jacoby & Chestnut, 1977) cited in Ishak et al., literature review on loyalty have suggested that a behavioral definition needs to be revised because it does not distinguish between true and spurious loyalty that may result, for example, from a lack of available alternatives for the consumer.

Sun et al. (2022) summarize loyalty as reflecting the deep commitment of customers to the companies or brands they prefer. Loyal customers will continue to purchase a company's products repeatedly, continue to use the products, and or recommend the products to others (Wolter et al., 2017). Loyalty research tends to focus on behavioral and attitudinal features (Wang & Zhang, 2018; Wolter et al., 2017). Regarding behavioral loyalty, early work in this area found that repeated purchases did not necessarily reflect

31

loyalty on the part of the customer and that additional consumer preferences should also be considered (Jacoby & Chestnut, 1977). Attitudinal loyalty is the willingness to talk positively about a product or company, recommend products or services, and encourage others to use them (Choi & Kim, 2020). Söderlund (2006) cautioned against using two factors to measure loyalty and supported this recommendation with empirical findings that a better measurement model results when repatronage intentions and word-of-mouth intentions show as two separate factors and not a single factor. Thus, this study will only use one factor to measure loyalty, based on an interest in the behavioral outcome over the attitudinal one for mobile food delivery apps. For this research, loyalty to mobile food delivery services is defined as a customer's favorable outlook toward the service provider, resulting in repeat buying behavior.

Conceptual Framework

The proposed model (Figure 1) reflects the variables selected to respond to the research question: What factors of innovative app design lead to loyalty for U.S. based mobile food delivery services?

Previous studies support using the Stimulus-Organism-Response (S-O-R) model for analyzing product attributes and their impact on users' behavioral responses (Parboteeah et al., 2009). Therefore, the S-O-R model is applied to the context of mobile food apps.

This research is undertaken to understand the impact of various design attributes (stimuli) including aesthetics, app appeal, usability, and emotional value on a users' engagement (organism) with the mobile app to garner action (response).
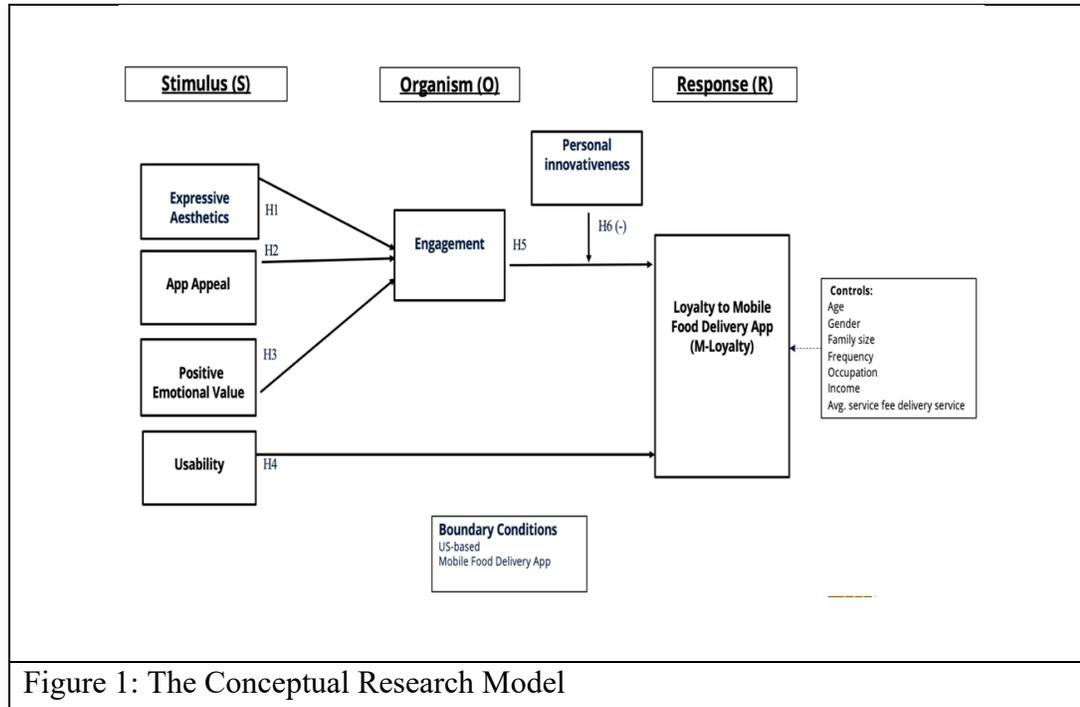
Figure 1: The Conceptual Research Model

The following section will outline the proposed relationship with each variable included in the above model.

Expressive Aesthetics and Engagement

Both technological innovation and aesthetic design are important because the application determines the novelty an innovation presents to users (Joo-Eon, 2023). Aesthetics in the study of user experience is identified as one of the critical influences on users' perceptions of products (Lavie and Tractinsky, 2004) and is considered necessary in influencing the overall judgment (Diefenbach and Hassenzahl, 2009; Lavie and Tractinsky, 2004). Muller and de Klerk (2020) in their study on wearable devices explore both aesthetics and brand and posit that design aesthetics will positively influence consumers' intention to use wearable tracking devices. The results show design aesthetics are significantly related to the intention to use. (Muller and de Klerk, 2020). Another study tests two types of aesthetics, classic (clean, simple, clear) and expressive (fascinating, sophisticated, original), to determine their comparative impact on persuasiveness for modeling behavior using a health app. Based on SEM analysis, expressive aesthetics had a stronger direct effect than classical aesthetics on the persuasiveness of app use (Kiemute et al., 2018). Studies have shown that visual aesthetics can increase customer engagement (Kim et al., 2013), affect user experience (Hou and Ho, 2013), and influence revisit rates and loyalty intentions of app users (Cyr et al., 2006). As supported, app design characteristics can result in user satisfaction and the likelihood of revisits, thereby resulting in loyalty.

Based on extant evidence and the selection of expressive aesthetics for its enhanced persuasiveness on app usage, expressive aesthetics is expected to have a positive relationship on user engagement, leading to the proposed hypothesis.

H1. Expressive aesthetics has a positive effect on engagement with mobile food delivery apps.

App Appeal (Attractiveness) and Engagement

Puccinelli et al. (2009) defined attractiveness as the internal perception of an app's interface. They also found that attractiveness has a positive impact on all stages of the decision-making process: need, information search, alternative evaluation, purchase, and post-purchase.

In their study on engagement, Jiaming et al. (2017) found that as a part of app design, user interface (UI) attractiveness, and compatibility are the most salient app attributes stimulating engagement. Attractive UI design is recognized to be a powerful tool for grabbing users' attention, supporting interaction, and creating immersive and compelling experiences (Coursaris & Van Osch, 2016; Cyr et al., 2006; Santosa et al., 2005). Prior research reports that having a visually appealing UI is essential for a user's interaction experience and their level of psychological engagement (Rozendaal, 2007; Santosa et al., 2005), and a lack of UI attractiveness can deter the willingness to engage in the interaction (Brangier & Desmarais, 2013). Furthermore, because of the attractive interface design, users' sensory and cognitive curiosities increase (Peters et al., 2016), which may increase the chance of users devoting time, effort, and energy to use the app. App attributes, such as vividness, interactivity, and novelty, can affect branded app engagement (McLean et al., 2020), facilitating continuous usage intentions. Customer

engagement with mobile apps can enhance brand equity and brand repurchase intention (Ho and Chung, 2020).

Bloch et al. (1995) write that behavior responses to design can be described as either approach or avoidance. Approach behaviors reflect an attraction to a design and include spending time exploring a site. Avoidance behaviors represent the opposite. Bloch et al. (1995) conclude that when a particular form elicits positive psychological responses, the consumer will tend to engage in approach activities, such as extended viewing, listening, or touching of the product. In their research, Fang et al. (2017) introduces the impact of alternative attractiveness on users' behavioral intention toward mobile payment apps. Fang et al. (2017) research established that travelers attracted to the alternative app's key attributes tend to stop using the current app and start using the alternative one, impacting the continuance intention. Accordingly, a poorly designed app, which customers abandon after only a few uses, may hurt the user experience and company revenues. Engaged users are relevant to platform performance as they grant greater attention and intention to interact with a platform.

As such, it is reasonable to infer that the attractiveness (app appeal) of mobile food delivery apps will positively impact user behavior by earning greater attention and interaction, which contribute to engagement. As such, the following hypothesis is proposed.

H2. App appeal (attractiveness) has a positive effect on engagement with mobile food delivery apps.

Emotional Attributes and Engagement

Prior studies have revealed that emotions are associated with intentions (Handayani et al.,2017).

With a branded app, the branded app can establish connections and build relationships only when constant and continuous usage occurs (McLean et al., 2018). Ongoing app usage intention indicates that a consumer intends to continue, rather than discontinue, using a branded app. Through continuous app usage, a user will likely build a positive attitude and loyalty. Extant research has also shown that perceived emotional value mediates the effect of technology features, such as website personalization, on consumers' responses to purchase intention in online shopping (Pappas et al., 2014). Additionally, perceived emotional value mediates the effect of customers' beliefs on adoption behavior (Kim et al., 2007).

In the context of using mobile food delivery (MFD) apps, consumers are likely to experience positive emotions because MFD apps reduce their waiting time and make the food available in the shortest delivery time. Further, the MFD app also offers multiple discount coupons, which further increase the positive experiences among consumers (Ray et al., 2019). These positive experiences form strong attachments between the consumers and the apps, inducing revisit intention for the app (Ray et al., 2019). This retention of positive experience towards an app invokes pleasure in a consumer promoting the revisiting of the app (Zarantonello and Schmitt, 2010).

Consequently, emotional value is proven to impact purchase intention and adoption behavior. This research will investigate if positive emotional value while using or after

using the mobile food app will impact engagement and ultimately lead to loyalty through continued app use. As such, the following is the proposed hypothesis:

H3: Positive emotional value positively effects engagement with mobile food delivery apps.

Usability and Loyalty

Previous research has suggested that usability plays a vital role in establishing customer loyalty and positive word of mouth (WOM) in the context of websites (Casaló, Flavián, and Guinalíu 2008). Indeed, retaining consumers and generating positive WOM (or referral) have been recognized as essential goals in mobile commerce (Okazaki 2009). Empirical evidence suggests that perceived benefits—mobile app usefulness and playful engagement—positively influence continued mobile app usage and WOM intention (Kim et al., 2016). Per the usability-loyalty model for websites (Casaló et al., 2008; Flavián et al., 2006), they proposed that branded app usability should positively predict continued branded app usage and referral intention, thereby indicating higher brand loyalty.

Roy, et al., (2014) view continued branded app usage intention as the most predictable driver of customer loyalty. This proposition also aligns with previous findings of a positive relationship between stickiness and commitment in an online context. For example, a higher level of stickiness—a user's intention to continue browsing a website (Lin 2007)—led to stronger customer e-loyalty (Reichheld and Schefter 2000). Consequently, it is predicted that strong beliefs about a mobile food app's usability could encourage users to keep using the app, thereby driving loyalty. Therefore, the following is the proposed hypothesis:

H4. Usability has a positive effect on loyalty to the mobile food delivery apps.

38

Engagement and Loyalty

Overall, user retention and stickiness are considered one of the market's most desirable but challenging tasks (Racherla et al., 2012). Loyalty is a widely studied factor in marketing literature. Buchanan (1985) suggested the dimensions of loyalty include behavioral consistency, affective engagement, and the degree of investment in the chosen activity.

Customer engagement is a concept that has been used in the literature to predict consumer behavior, including loyalty and word-of-mouth advertising (Thakur, 2016). According to Bowden's (2009) conceptual model, customer loyalty comes from the customer engagement process. A theoretical model of customer engagement by Vivek et al. (2012) also suggested that word-of-mouth and loyalty were outcomes of this engagement. They distinguish between customer engagement and brand loyalty and contend that people involved with a brand form a close bond with it and form more favorable attitudes toward it, consequently resulting in a higher likelihood of loyalty to that brand.

Engaged customers frequently interact with mobile applications leading to stronger purchasing intentions and service loyalty. Good user experience helps increase user engagement, increasing customer loyalty (Fling, 2009). The implications of customer engagement could be perceived value, happiness, trust, commitment, and loyalty (Brodie et al., 2011; Brodie et al., 2013). Bowden (2009) wrote customer engagement shares a positive and linear relationship with customer loyalty. Engaged users become loyal to the product or service and suggest other possible users use the mobile application (Tarute et al., 2017). Accordingly, if consumer interaction causes a level of engagement with the

mobile food delivery app, that engagement can lead the user to be loyal to the app. Therefore, the following is the proposed hypothesis:

H5. Engagement has a positive effect on loyalty toward food mobile delivery apps.

Personal Innovativeness and the Engagement and Loyalty Relationship

Mendijel et al. (2017) in their paper summarize that observations focused on the relationships between trust, satisfaction, and loyalty have emphasized the importance of potential moderators. Mendijel et al. (2017) explore several consumer personality traits, including personal innovativeness, variety-seeking behaviors, and relationship proneness, and conclude they may affect the performance of relationship marketing activities. Personality is defined as "those inner psychological characteristics that both determine and reflect how an individual responds to the environment." Based on the impact personality traits can have on marketing efforts and outcomes, this study selected personal innovativeness as a moderator of the app engagement–loyalty relationship (Mendijel et al., 2017)

Generally, consumers with higher personal innovativeness are more willing to take risks and become early adopters (Mohammadi et al., 2014). These people tend to express more positive attitudes and stronger intentions about new technologies (Krey et al., 2019). Individuals with high personal innovativeness are likely to accept technology more quickly than others (Mohammadi et al., 2014; Krey et al., 2019). Nevertheless, these people are willing to quit the current technology-based products to follow the newer technology (Cheng et al., 2014). High personal innovativeness means a higher tendency to accept a risk and lower engagement with a brand (Lee et al., 2019). Alkawsi 's et al. (2021) work

also validated that brand engagement between two partners is less enduring toward innovative consumers who quickly become bored with the current technology.

In their article on travel apps, Fang et al. (2017), personal innovativeness had a negative influence on continuance intention, the authors inferred that travelers with a high degree of personal innovativeness tend to be novelty-seeking, and due to their intense curiosity, higher confidence and tolerance in handling changes, are more inclined to discover new travel apps (possibly with new features or better deals), hence, making them less willing to stay long periods with the current one. As such, the users should be classified as early users (innovators and early adopters) and late users (early majority, late majority, and laggards).

Consequently, personal innovativeness can be associated with characteristics that impede user stickiness or the advancement of repetitive behaviors. As such, a user's innovativeness can impact their willingness to continue using a food delivery app, jeopardizing loyalty behaviors. Therefore, the hypothesis is:

H6. Personal innovativeness (PI) has a negative moderating effect on the relationship between engagement and loyalty of mobile food delivery apps such that when PI is high the loyalty with food delivery apps would be weaker than when PI is lower.

Control Variables

To control for extraneous effects arising from individual characteristics, we will incorporate the following variables: gender, age, occupation, family size, income, and the average price paid through the mobile food delivery app. When considering demographics as control variables in app-related services, researchers have also shown that they exert a

more substantial influence (Stavins, 2016). These variables are selected based on their potential impact on user behavior, particularly concerning engagement and loyalty.

The first two variables—gender and age—are specified and controlled for their possible effects to significantly influence customers' intentions to use services or apps and, ultimately, brand loyalty (Fang, 2019).

Previous research highlighted the importance of having an occupation in understanding how individuals use technology daily (Hwang, 2019). There are considerable differences in the behavioral patterns of customers using internet-based services (e.g., frequency, time of the day) based on the critical personal factor of occupation (Reisdorf, 2017). Income has shown differences among consumers while studying the impact of household income on food shopping and consumers' food waste behavior (Di Talia et al., 2019). Service fee pricing is included less often as a control; this study will control for it to account for its influence on choice of app.

IV: RESEARCH METHODOLOGY

Population

The population of interest for the pilot and main study will be users of mobile food delivery (MFD) apps over 18 years old. MFD users will vary in their levels of use. The participants will be in the U.S. and have used a food delivery app in the last 90 days.

Sample Population

This research will consist of four phases: (1) informed pilot, (2) item refinement, (3) pilot study, and (4) the main study. The informed pilot will include 4-6 individuals, including marketing and design subject matter experts (SMEs). Next, for the pilot study, participants come from Cloud Research, an online platform that recruits and distributes surveys. Cloud Research will recruit a total of 150 participants. The main study is based on a population estimate of mobile phone owners (281 million), a z- score of 5%, and a 95% confidence interval. All participants will come from Cloud Research recruiting efforts for a total of 385 participants. All participants will be residents of the U.S., and Cloud Research participants will receive compensation of $1.50 per completed survey.

Research Design

The model evaluation and hypotheses utilize a quantitative study for data collection, which will be a survey design. The survey development process will begin with an informed pilot. A few colleagues and SMEs will review and evaluate an initial set of scale items. Collected learning from the informed pilot will be integrated into a revised pilot; the next phase helps facilitate construct validity and reliability. The pilot study will build the foundational basis for the main survey while providing initial feedback on research design,

content, and construct validity. Construct refinements will follow the pilot to improve all facets of the instrument, including factor analysis and reliability testing. Table 1 highlights all the phases.

Table 1: Research Phases

Phases	Phase One	Phase Two	Phase Three	Phase Four
Study	Informed Pilot	Item Refinement	Pilot	Main study
Est. Sample Size	3-4	n/a	150	383
Validity Testing	Face, Internal		Construct, Scale, Discriminant and Reliability	Construct, Scale, Discriminant and Reliability

The proposal's scope will be for the informed pilot, pilot, and main study, followed by analysis. The pilot and main study will be constructed using Qualtrics and distributed through Cloud Research.

Measurements

The literature review, specifically the work in innovative design research (Moon et al., 2012) and the S-O-R model, Mehrabian and Russell (1974) form the foundation for instrument development, allowing for the identification of constructs and their measures. Several measures and their items are validated and adapted from prior studies. In turn, measures will serve to inform and improve upon less applied constructs to innovation design research.

All variables are measured by extant studies. Expressive aesthetics, a type of aesthetic, is validated by Lavie and Tractinsky (2004) and includes five items including creative, original, sophisticated and uses different features. Expressive aesthetic items gauge how unique or different the app appears to the user. App appeal (attractiveness)

follows and is considered an integral part of innovative design, used by Joen, 2021 in a study on extended reality, modified slightly to include app design. The items include questions about app design and determines whether the user considers it pleasant, enjoyable, or friendly. Previous research by Lavie, 2004 and Joen, 2021 validated the constructs and their five-item composition. Positive emotional value, a newer construct in technology research, is part of a comprehensive construct that could include negative emotions. Positive emotional value is the emotion experienced when using or after app use; emotional value items include feelings of gratitude, pleasure, thrill, and joy. A total of five items are validated by Lavie et al., 2004. Usability, a well-established construct, is foundational to innovative design as it relays the user's impressions of the app's functionality. Studied are validated by Lavie et al., and Joen, 2021, this construct consists of five items.

Personal innovativeness, a self-reported instrument for measuring the degree of personal innovativeness, has been well-established and operationalized by Agarwal and Prasad (1998) as a four-item scale and incorporates the following types of questions; In general, I am hesitant to try out new technologies and I like to experiment with new technologies.

Similarly, engagement as a mediator has a large body of previous research focused on its psychological process (Bowden, 2009). The addition of behavioral engagement (Kim et al., 2013; Verhagen et al., 2015) was operationalized for mobile app user engagement by Kim and Baek (2018) and includes items like; this app inspires me, and I have an emotional connection to this app. The engagement construct has five items. The remaining construct, loyalty, reflects a deeply held commitment to repurchase or continued use

(Oliver, 1999). Loyalty items will include "I would use this app again", and "I would recommend this app to family and friends".

Extensive research in loyalty and its components makes it a well-developed construct using four items. Loyalty as a construct has been operationalized in the works of many researchers, such as Zeithaml, Berry, and Parasuraman (1996). All items use a five-point Likert scale, ranging from strongly disagree to agree strongly.

Table 2: Construct Definitions

Construct	Definition	Source
Mobile Food Delivery App Loyalty (Loyalty)	A deeply held commitment to re-purchase or re-patronize a preferred product/service consistently in the future.	Oliver, 1999
Engagement	Users continued interaction with a product/app.	Kim et al., 2013, Verhagen et al., 2015)
Personal Innovativeness	The degree to which a person believes her/she is positively predisposed towards the use of new technologies	Agarwal and Prasad, 1998 Lee et al., 2007
Expressive Aesthetics	Is manifested by the designer's creativity and originality and their ability to break design conventions.	Lavie et al., 2004
App Appeal (Attractiveness)	Is an internal feeling of the app's interface.	Joen, 2023
Emotional Attributes	Emotions experienced by customers when or after using the app.	Lavie et al, 2004
Usability	Is functional performance of the app?	Joen 2021 Lavie et al., 2004

Table 3: Preliminary Constructs and Items

Construct	Items	Citation
Dependent Variable		
M-Loyalty	LOY1. I would use this app again LOY2. I would consider using this app in the future LOY3. I would recommend this app to my family and friends LOY4. I seldom consider switching to another app	Cyr et al., 2006, Floh and Treiblmaier, 2006, Zeithaml, Berry and Parasuraman, 1996
Mediator		
Engagement	ENG1. I am inspired by this mobile app. ENG2. I have an emotional connection to this mobile app. ENG3. I am always learning about new things from this mobile app. that would help me make better decision in my life. ENG4. This mobile app constantly provides fodder for conversation that I have with friends and family. ENG5. This mobile app is special to me because the time I spend with this media element is enjoyable and considered "time just for me."	Kim et al., 2013, Verhagen et al., 2015)
Moderator		
Personal Innovativeness	PII1. If I heard about a new technology, I would look for ways to experiment with it. PII2. Among my peers, I am usually the first to try out new Technologies. PII3. In general, I am hesitant to try out new technologies. PII4. I like to experiment with new technologies.	Leonard-Barton and Deschamps,1988 Agarwal and Prasad, 1998
Independent Variables		
Expressive Aesthetics	AES1 The app design is creative? AES2 The app design is fascinating? AES3 The app design is sophisticated? AES4 The app uses different features? AES5 The app design is original?	Lavie et al., 2004
App Appeal (Attractiveness)	ATT1. The app design is friendly. ATT2. The app design is pleasant?	Jeon, 2023, Coursaris and Van

	ATT3. The app design is enjoyable.	Osch 2016, Cyr et al., 2006
	ATT4. The app design is engaging	
	ATT5. The app design is pleasing	
Usability	USA1. The app design makes it easy to use.	Lavie et al, 2004, Joen 2021
	USA2. The app design makes it convenient to use	
	USA3. The app design makes it easy to navigate	
	USA4. The app design is practical?	
	USA5. The app design is clear?	
Positive Emotional Value	EMO1. I feel gratified.	Lavie et al., 2004
	EMO2: I feel thrilled.	
	EMO3: I feel fulfilled.	
	EMO4: I feel pleasure.	
	EMO5: I feel joy.	

The following section will report on the data collection process and the analysis from the collected data. The data collection process consisted of three phases: phase one, is an informal qualitative approach to gaining initial feedback on the survey instrument before testing with larger numbers of the target audience. The informed pilot tests interview questions for comprehension, completeness or bias. The second phase, the pilot, introduces the survey to a larger population of the target audience, who are recruited for their participation and meet the criteria to complete the survey. For this study, Cloud Research conducted the recruiting of participants and Qualtrics hosted the survey for completion. The aim of this phase is to test the survey and adopt any findings and refinements that came from the informed pilot phase. The final and third phase is the main study, where a statistically sound number of individuals are recruited to take the survey, this final phase will test the survey with additions or elimination of questions that came from the pilot phase.

The analysis will include findings from each of the phases: the informed pilot, pilot and main study. Along with the descriptive analysis of the audience, item and model fit, and reliability and validity measures. Analysis tools such as SPSS and SEM-PLS are employed to assist in the analysis of findings.

Informed Pilot

The informed pilot consisted of a total of five participants, two of them doctorate candidates who use food delivery apps to varying degrees. One student with a background in Project Management used food delivery apps consistently, while the other, a HR

professional used the app less often. The design experts consisted of a VP of Product Management and UX Development at a leading financial institution, a Sr, Director of Product Design for a media organization. and a freelance Design Manager.

The purpose of the informed pilot was to gather experts and or food delivery users to gauge their response to prepared survey questions. The informed pilot participation assisted in the formation of a survey that is clear, easy to understand and comprehensive in its coverage of topics pertinent to food delivery services. Therefore, participants were requested to focus on three areas: one, desired question characteristics (clarity, comprehension, and question alignment to topic), second, undesirable question characteristics (biased, double barreled or ambiguous questions) and third, any missing questions based on the topic.

The doctorate candidates were either loyal to one branded mobile food delivery app or less loyal to a brand and more motivated by promotion/incentives. The peer discussion covered question order, word choice, and identifying repetitive and missing questions. Additionally, peer evaluation surfaced that regions and times of day can influence mobile delivery food app use behaviors and could be added to the demographic data collection if deemed an important aspect of the current research.

The subject matter experts (SMEs) represented the financial services, health care, and media industries. The feedback from this group focused on changing word choice, for example, eliminating the use of app design and replacing it with layout in appropriate areas, and included adding questions to specific areas where product design can be a solution in areas like app onboarding and engagement. All feedback was considered and weighed against the research scope and lead to further refinement of the survey instrument.

50

Pilot Results

The pilot was conducted with 150 mobile food delivery consumers, recruited using Cloud Research. Participants selected had to be users of at least one of the primary food delivery apps: Uber Eats, DoorDash, GrubHub, Postmates, or Caviar (at least at the time of the study).

Once data was retrieved it was cleaned to remove unnecessary data before analysis commenced. Data cleaning begins by eliminating surveys completed in an unrealistic amount of time (under 30 seconds). Next, surveys with incomplete responses are eliminated and respondents who fail the attention check questions' responses are removed. Once data cleaning is finished, questions are coded and rephased or shortened in SPSS for easier recognition. The process began by conducting confirmatory factor analysis. As part of the factor analysis, the following will occur, the removal of redundant or double-loaded questions, rewriting of questions, and the addition of new questions. After completing the reduction of items, the validated survey is now suitable for use in the main study to undergo further analysis.

The following section provides descriptive evaluation of the pilot participants. The pilot study consisted of 52% male, 43% women and 4% non-binary. Table 4 shows that sixty percent of participants were 26—41 years of age. While nearly a quarter were 42-49 year of age, 18-25 years old and those 58 to over 65, represent 9% and 6% respectively. Table 4 also shows that most of the participants are educated (63%) comprising of bachelor's degree to doctorate level studies.

Table 4: Age and Education

Age	Frequency	Percent	Education	Frequency	Percent
18-25 years old	14	9.3	High School or equivalent	19	12.7
26-33 years old	42	28.0	Technical or occupational certificate	2	1.3
34-41 years old	48	32.0	Associate Degree	10	6.7
42-49 years old	24	16.0	Some college	24	16.0
50-57 years old	9	6.0	Bachelor's Degree	72	48.0
58-65 years old	11	7.3	Master's Degree	18	12.0
Over 65 years old	2	1.3	Doctorate Degree	5	3.3
Total	150	100	Total	150	100

The lowest and highest household incomes shown in Table 5 are evenly distributed in participation at 18%. Those making $31K-60K (27%) make up the largest group of participants while those with higher incomes of $91K-121K and over make up over a third (33%) of the participants. In addition to income, family size data was collected. Participants are closely distributed across household members. Two and four member households have similar representation at around twenty-four percent (24%) while just slightly lower is the three member households at 21% followed by single households at 18%. Families for four plus members are the smallest group at 12%.

Table 5: Household Income and Family Size

Household Income	Frequency	Percent	Family Size	Frequency	Percent
$0-$30,000	27	18.0	1	27	18.0
$31,000-$60,000	41	27.3	2	36	24.0
$61,000-90,000	32	21.3	3	32	21.3
$91,000-$120,000	22	14.7	4	37	24.7
$121,000 and over	28	18.7	4+	18	12.0
Total	150	100	Total	150	100

Table 6 shows most respondents hold manager and professional positions (55%) while 21% are working in occupations unmatched by the categories provided. In Table 7 more than half of the study's respondents have used a mobile food delivery app within the week (51%) and another third (32%) a few weeks ago. This satisfied the study requirement for participants to have used a mobile delivery app within the last 90 days.

Table 6: Occupation

Occupation	Frequency	Percent
Manager	32	21.3
Professional. (business, legal, health, engineering, science and tech., teaching)	50	33.3
Technician	6	4.0
Clerical Worker	8	5.3
Service Worker	11	7.3
Sales	9	6.0
Craft related trade worker	2	1.3
Agricultural, fishery and forestry workers	1	0.7
Other	31	20.7
Total	150	100

Table 7: Last Usage of Food App

Mobile Food Delivery App Last Used	Frequency	Percent
Today	3	2.0
This week	77	51.3
A few weeks ago	48	32.0
A month ago	13	8.7
Over a month ago	2	1.3
2-3 months ago	3	2.0
More than 3 months ago	4	2.7
Total	150	100

Table 8 indicates mobile food delivery apps are used regularly, as 55% of the participants use the app weekly or a few times a week. While a third of the group (30%) use the app monthly. Daily use is only 4% and those using the app seldomly is 10% of the participants.

Table 8: Food App Usage

Mobile Food Delivery App Usage	Frequency	Percent
A few times a day	2	1.3
Daily	6	4.0
A few times a week	41	27.3
Weekly	41	27.3
Monthly	45	30.0
Seldomly	15	10.0
Total	150	100

The majority (84%) of those surveyed pay $6.00 or less in service fees, shown in Table 9, while respondents paying $4-$6 are the largest part of the majority at 61%. Nearly a quarter of the participants are paying less than $3.00 to use the mobile delivery service and over 10% pay $7-9. Table10, shows which provider(s) was used over the last 90 days, participants report using primarily Door Dash and Uber Eats followed by Grub Hub. Table 11 shows the preferred food delivery provider among participants is Uber Eats at 45% followed by Door Dash with 39% and then GrubHub at 15%. Postmates and Caviar, receive little or no preference.

Table 9: Average Service Fee Paid

Average Service Fee	Frequency	Percent
Less than $3.00	34	22.7
$4.00-$6.00	92	61.3
$7.00-$9.00	17	11.3
$10.00 and over	7	4.7
Total	150	100

Table 10: Food Delivery Provider Used in Last 90 Days

Food Delivery Providers used in the last 90 days	Frequency	Percent
Door Dash	108	72.0
Uber Easts	100	66.7
GrubHub	62	41.3
Caviar	2	1.3
Postmates	17	11.3

Table 11: Preferred Provider

Preferred Provider	Frequency	Percent
Uber Eats	68	45.3
GrubHub	23	15.3
DoorDash	58	38.7
Postmates	1	0.7
Total	150	100

Table 12 verifies that 85% of participants interact with the service using a downloaded app. Then next most common way at 9% is either from a downloaded app or the restaurant's website. Customers visiting the restaurant website to place a delivery order is a close third at 3.3%. According to Table 13, many participants are moderately satisfied using their app of choice (61%), while nearly 25% say they are very satisfied. Nine percent are neither satisfied nor unsatisfied and only a small number (0.7%) of respondents report extreme dissatisfaction.

Table 12: Source of App Interaction

How do you interact with the food delivery mobile app	Frequency	Percent
From the app downloaded on my phone	128	85.3
From an app downloaded on my desktop	6	4
From an app downloaded on my tablet	1	0.7
From an app downloaded on my laptop	2	1.3
From the restaurant website	5	3.3
From either a downloaded app or the restaurant website	8	5.3
Total	150	100

Table 13: Overall Satisfaction

Overall satisfaction using the app?	Frequency	Percent
Very satisfied	38	25.3
Moderately satisfied	92	61.3
Neither satisfied nor dissatisfied	13	8.7
Moderately dissatisfied	5	3.3
Very dissatisfied	1	0.7
Total	149	99.3

After the preceding prescriptive analysis was completed a confirmatory factor analysis was executed using Jamovi, a statistical software, to determine whether the items adequately represented the constructs. The analysis of the measurement model for the pilot was conducted with a confirmatory factor analysis (CFA) using the lavaan package (Rosseel, 2012) through the Jamovi graphical user interface (GUI) for the R system. Jamovi is a software which implements an interface to the underlying R package which eliminates the need for direct coding of the analysis. The actual execution and reporting of the analysis, however, is performed with the lavaan package.

The CFA called for the evaluation of each item's loading to determine if each item was specified to load on its intended factor. Most loadings were significant, however, those

that were not significant and low were then removed. Table 14 displays the finding from the CFA, including the item loadings from the pilot along with their associated standard deviation and p-values.

Table 14: Pilot Loadings

Factor Loadings

Factor	Indicator	Estimate	SE	Z	p	Stand. Estimate
AES	Q10__1	0.7623	0.0636	11.985	< .001	0.8192
	Q10__2	0.8425	0.0684	12.319	< .001	0.8340
	Q10__3	0.9438	0.0767	12.312	< .001	0.8326
	Q10__4	0.7053	0.0791	8.918	< .001	0.6621
	Q10__5	0.8311	0.0688	12.078	< .001	0.8222
	Q10__6	0.8098	0.0726	11.152	< .001	0.7810
ATT	Q11_1	0.5874	0.0490	11.996	< .001	0.8146
	Q11_2	0.7329	0.0498	14.707	< .001	0.9226
	Q11_3	0.6946	0.0504	13.774	< .001	0.8880
	Q11_4	0.8120	0.0656	12.373	< .001	0.8321
	Q11_5	0.7201	0.0613	11.749	< .001	0.8041
USA	Q12_1	0.6248	0.0519	12.044	< .001	0.8341
	Q12_2	0.5294	0.0511	10.366	< .001	0.7601
	Q12_3	0.5710	0.0543	10.520	< .001	0.7578
	Q12_4	0.6803	0.0699	9.728	< .001	0.7215
	Q12_5	0.4441	0.0468	9.487	< .001	0.7029
	Q12_6	0.5088	0.0577	8.812	< .001	0.6631
	Q12_7	0.6058	0.0914	6.627	< .001	0.5365
PII	PII3R	0.0772	0.1100	0.702	0.483	0.0602
	Q13_1	0.7585	0.0561	13.527	< .001	0.8910
	Q13_2	0.9835	0.0812	12.112	< .001	0.8301
	Q13_4	0.6277	0.0554	11.329	< .001	0.7939
	Q13_5	0.6455	0.0548	11.778	< .001	0.8155
ENG	Q14_1	0.6216	0.0746	8.327	< .001	0.6515
	Q14_2	0.1991	0.0639	3.115	0.002	0.2715
	Q14_3	0.9868	0.0904	10.917	< .001	0.7909
	Q14_4	0.7589	0.0890	8.524	< .001	0.6597
	Q14_5	0.8694	0.0961	9.046	< .001	0.6841
	Q14_6	1.0051	0.0950	10.582	< .001	0.7849
	Q14_7	0.9037	0.1014	8.915	< .001	0.6793
EMO	Q15_1	0.7814	0.0645	12.108	< .001	0.8229
	Q15_2	0.8444	0.0782	10.796	< .001	0.7624
	Q15_3	0.8487	0.0680	12.475	< .001	0.8389
	Q15_4	0.7996	0.0603	13.257	< .001	0.8712
	Q15_5	0.9131	0.0663	13.766	< .001	0.8911
LOY	Q16_1	0.6008	0.0411	14.601	< .001	0.9344
	Q16_2	0.5733	0.0421	13.608	< .001	0.8904
	Q16_3	0.5447	0.0713	7.637	< .001	0.5925
	Q16_4	0.2657	0.0902	2.946	0.003	0.2487
	Q16_5	0.2654	0.0934	2.843	0.004	0.2396
	Q16_6	0.0950	0.1077	0.882	0.378	0.0760

Subsequently, the confirmatory factor analysis led to the removal of unacceptable loadings of .070 or lower, reducing the number of items from 41 to 27. Eliminations occurred in aesthetics, usability and personal innovativeness constructs. Engagement and loyalty construct also had several low loading items, resulting in their removal. The low loadings, indicate a weak relationship between the items and the construct used for their measurement. As a result, selected items from each of the constructs were removed, and the model was re-estimated with the remaining items, until all those remaining had

sufficiently high loadings for the construct. Table 15 shows the items excluded after the confirmatory analysis.

Table 15: Items removed after Confirmatory Factor Analysis.

Items	Loading
AES4 - The app design is sophisticated?	0.662
USA4 - The design allows me to resolve issues quickly?	0.722
USA5 - The app allows me to accomplish what I want to get done?	0.703
USA6 - The app remembers my preferences?	0.663
USA7 - The app design impacts my choice of mobile food delivery app?	0.537
PII3 - In general, I am hesitant to try new technologies?	0.060
EMO2 - I feel thrilled?	0.762
ENG1 - I use many features on this app?	0.065
ENG2 - I use the promotions and special offers provided by this app?	0.273
ENG4 - I have customized this app to my personal preferences?	0.659
ENG5 - I engage with push notifications from this app?	0.684
LOY3 - I would recommend this app to my family and friends?	0.592
LOY4 - I seldom consider switching to another app?	0.287
LOY5 - I seldom use other apps?	0.239
LOY6 - I would talk or write about it on social media	0.076

Table 16 highlights the remaining items after all the low loading items are removed along with the reliability and AVEs of the remaining items. This in turn, provides the statistical validity for the conceptual model and becomes the basis for continuing to refine and evaluate items and their constructs for the main study.

58

Table 16: Pilot Results Summary

Latent	Label	Indicators	Loadings	Indicator Reliability	AVE
				Pilot Results Summary for Reflective Measurement	
				Convergent Validity	
Aesthetics	AES1	The design is original	0.779	0.862	0.660
	AES2	The design is creative	0.797		
	AES3	The design is fascinating	0.838		
	AES4	The app represents the latest in technology	0.825		
	AES5	The app uses different features than competitors	0.800		
App Apeal (Attractiveness)	ATT1	The app is friendly	0.817	0.933	0.727
	ATT2	The app is pleasing	0.925		
	ATT3	The app is welcoming	0.890		
	ATT4	The app is fun to use	0.829		
	ATT5	The app keeps my attention	0.798		
Positive Emotional Value	EMO1	I feel gratified	0.818	0.918	0.737
	EMO2	I feel fulfilled	0.838		
	EMO3	I feel happy	0.884		
	EMO4	I feel joyful	0.884		
Usability	USA1	The design makes it easy	0.897	0.877	0.705
	USA2	The design makes it convenient to use	0.854		
	USA3	The design is clear	0.766		
Engagement	ENG1	I have an emotional connection to this app	0.854	0.860	0.670
	ENG2	I share recommendations from this app on social media	0.887		
	ENG3	I use the app for other services it offers	0.719		
Personal Innovativeness	PII1	If I hear of a new technology, I look for ways to experiment with it	0.890	0.897	0.691
	PII2	Among my peers, I am usually the first to try new technnologies	0.830		
	PII3	I like to experiment with new technnologies	0.794		
	PII4	If someone recommends a technology I tend to try it	0.817		
Loyalty	LOY1	I will use the app in the future	0.936	0.917	0.846
	LOY2	I will use the app again	0.905		

The Average variance extracted (AVE) is a measure of how much variance in the indicators is explained by the latent variables. A value of 0.50 or greater generally represents good validity. Table 16 shows that all the AVEs for latent variables are 0.6 and higher, indicating that on average, a construct explains at least 60% of the variance in its set of indicators. For the composite reliability measure, a target of at least 0.70 indicates that the shared variance between a composite of the items and the construct they are intended to measure is at least 70%. In conclusion, Table 16 confirms that all latent variables reflect this variance quality. The discriminant reliability shown in Table 17 shows that construct pairs are

distinct, Rönkkö and Cho (2022) in their paper review guidelines for discriminant validity and record cutoffs from recent simulation studies that propose cutoffs of .85, (Henseler et al. (2015) and supported by Kline (2011) also suggest cutoffs of .85 and .9. Based on the following, all the pairs in Table 17 measure less than 0.90 and therefore show acceptable discriminant validity. All correlations are less than 1.0 indicating that there are low similarities between the variables. The Chi-square difference and p-value ($p < .05$) illustrate both positive and significant relationship pairs.

Table 17: Discriminant Validity

Construct Pair		Correlation	Chi-square Diff.	P-value
AES	ATT	0.790	13.08	0.00
AES	USA	0.552	66.25	0.00
AES	PII	0.442	99.32	0.00
AES	ENG	0.753	17.05	0.00
AES	EMO	0.690	35.84	0.00
AES	LOY	0.254	171.54	0.00
ATT	USA	0.686	37.51	0.00
ATT	PII	0.406	116.43	0.00
ATT	ENG	0.578	63.09	0.00
ATT	EMO	0.788	15.55	0.00
ATT	LOY	0.533	83.49	0.00
USA	PII	0.426	102.90	0.00
USA	ENG	0.297	131.61	0.00
USA	EMO	0.553	70.61	0.00
USA	LOY	0.388	114.54	0.00
PII	ENG	0.357	120.11	0.00
PII	EMO	0.290	145.82	0.00
PII	LOY	0.292	167.12	0.00
ENG	EMO	0.567	64.44	0.00
ENG	LOY	0.115	182.94	0.00
EMO	LOY	0.509	87.22	0.00

AES=aesthetic, ATT=attractiveness (app appeal), USA=usability, PII=personal innovativeness
ENG=engagement and EMO=emotional value.

After summarizing the pilot results, the following actions were necessary: the identification of items that could replace any of the removed items and the addition of new items in the constructs where removals occurred. Table 18 shows new items, these additions were also executed to ensure that at least 3 items were used for each construct and therefore reinforced a broad spectrum of items for critical constructs like engagement and loyalty.

Table 18: Items added after low loadings removals.

Items
USA4 – The app design is practical?
USA5 - The app design makes it easy to navigate?
ENG5 - I aways rate after using the service?
ENG6 - I have customized this app to my personal preferences?
ENG7 – I am always learning about new things about this app that would help me to make better decisions in my life?
LOY3 – I encourage friends and family to use the app?
LOY4 – I will share my testimonial of using the app?
LOY5 - I continue to order from my preferred app even if the price increases?
LOY6 – I say positive things about the app?

USA=usability, ENG=Engagement, LOY=loyalty

In summary, the following steps were completed, an informed pilot which allowed for the review and assessment of individual items with a selected group of individuals with specific association to the topic. Once the informed pilot was completed, items were assessed and changed or removed to strengthen the instrument. After the informed pilot a pilot was conducted with a larger sample of food delivery users. Items were tested to gather feedback and loadings were evaluated for their fit for the construct. Upon completion of the pilot, items with low loadings were removed and replaced with items that would be tested with an even larger sample during the main study. The following are the results of the main study.

Main Study Results

For the main study, the purpose is to test the research model and its hypotheses. This specific analysis of the reflective model uses SmartPLS (4), a structural equation modeling (SEM) software to test hypotheses and demonstrate causal relationships between innovative app design variables, engagement, and the subsequent relationship between engagement and loyalty. The analysis will include construct reliability and validity, content validity, discriminant and convergent validity (AVE). Further analysis will include a structural equation model with moderator analysis and bootstrapping, and assessment of correlation strengths. The data collection approach for the pilot was replicated for the main study. The same criteria and qualifications used to select participants for the pilot study were used in main study. Qualtrics was again used for survey distribution and Cloud Research Connect for survey recruitment and payment.

The main study's analysis begins with a descriptive evaluation of survey participants, Table 16 highlights the study's 383 participants, consisting of 54% (207) males and 46% (167) women, and 4% (8) non-binary. The age of most participants falls between 26-41 (62%), with 26–33-year old's representing the largest individual age segment (32%). Those 42-49 years old represent the third largest group at 17% followed by 18–25-year-olds (13%). Those over 50 account for less than 10% of the participants. Table 19 also illustrates that most participants are educated with a bachelor's degree or higher (60%) while those with high diplomas or a technical equivalent only account for 14%. The size of households, depicted in Table 20 shows households with 2-3 members account for 54% of respondents, single households account for 23% and larger households of 4 or above account for 23% of participants. Regarding income, Table 20, the largest

number of participants (28%) make between $31K-60K annually, the next highest at 25%

earn a household income of $61K-90K. Income falling on the lower end of the range and

those on the higher end are similarly represented at 16% and 18% respectively.

Table 19: Age and Education

Age	Frequency	Percent	Education Level	Frequency	Percent
18-25 years old	50	13.1	High School or equivalent	44	11.5
26-33 years old	124	32.4	Technical or occupational certificate	6	1.6
34-41 years old	113	29.5	Associate Degree	40	10.4
42-49 years old	64	16.7	Some college	65	17.0
50-57 years old	15	3.9	Bachelor's Degree	163	42.6
58-65 years old	11	2.9	Master's Degree	55	14.4
65 +years old	6	1.6	Doctorate Degree	10	2.6
Total	383	100	Total	383	100

Table 20: Household Size and Income

Household Size	Frequency	Percent	Household Income	Frequency	Percent
1	88	23.0	$0-$30,000	62	16.2
2	122	31.9	$31,000-$60,000	110	28.7
3	86	22.5	$61,000-90,000	95	24.8
4	53	13.8	$91,000-$120,000	46	12.0
4+	34	8.9	$121,000 and over	70	18.3
Total	383	100	Total	383	100

Based on Table 21, a little over a third of the participants (32%) classify themselves

as professional, the next largest group is other at 26%, not aligning to any category shown.

Participants in management comprise of 15%, while the remaining participants are spread

out among other occupational capacities. Of the five national food delivery providers,

Table 22 shows in the last 90 days, most respondents report using DoorDash at 72% with Uber next at 57% and GrubHub is third with 32%. Postmates and Caviar show they are less likely to be used. Table 23 highlights that of the 383 respondents 47% prefer DoorDash while Uber Eats is in second place at 36% GrubHub is third at 15%. Postmates and Caviar are the least preferred service providers.

Table 21: Occupation

Occupation	Frequency	Percent
Manager	57	14.9
Professional. (business, legal, health, engineering, science and tech., teaching)	121	31.6
Technician	12	3.1
Clerical Worker	25	6.5
Service Worker	25	6.5
Sales	29	7.6
Craft related trade worker	6	1.6
Agricultural, fishery and forestry workers	4	1.0
Plant and machine operators and assemblers	2	0.5
House Cleaner	2	0.5
Other	100	26.1
Total	383	100

Table 22: Service Provider Used

Service Provider	Frequency	Percent
Uber	217	56.7
GrubHub	122	31.9
DoorDash	275	71.8
Postmates	32	8.4
Caviar	0	0
Total	383	100

Table 23: Preferred Service Provider

Preferred Service Provider	Frequency	Percent
Uber Eats	136	35.5
GrubHub	58	15.1
DoorDash	181	47.3
Caviar	1	0.3
Postmates	7	1.8
Total	383	100

Based on Table 24, most of the participants used their food delivery app in the last 90 days, which allowed for a variety of usage levels to participate in the survey. Most common, respondents report using the app within the week (47%) followed by a few weeks ago at 34%. The remaining frequencies are small, validating that the main study participants are current users of food delivery apps. However, participants range in how often they used the mobile food app, monthly is reported most often (33%), as shown in Table 25. While the next highest frequency is weekly (28%). Those using the app a few times a week follow at 21% of the participants. At the end of the range, daily users account for 2% and seldom users of the app comprise of 14% of the participants.

Table 24: Food Delivery Provider Used in Last 90 Days

Last time delivery app was used	Frequency	Percent
Today	18	4.7
This week	178	46.5
A few weeks ago	129	33.7
A month ago	23	6
Over a month ago	11	2.9
2-3 months ago	19	5.0
More than 3 months ago	5	1.3
Total	383	100

Table 25: Preferred Service Provider

Frequency of food delivery app use	Frequency	Percent
Daily	9	2.3
A few times a week	79	20.6
Weekly	107	27.9
Monthly	128	33.4
Seldomly	55	14.4
Discontinued my use	5	1.3
Total	383	100

Table 26 shows most of the participants are accessing the food delivery app via their phones (88%) while a small number are using the desktop exclusively (4%), additionally a combination of the app or the restaurant's website are used by 4% of participants to access the delivery provider of choice. Table 27 captures overall satisfaction of app users, out of all participants 60% are moderately satisfied with their app of choice and 27% of respondents describe themselves as very satisfied. There is a small number of respondents (0.5-4%) that are moderately to very dissatisfied.

Table 26: Access to Mobile Food Delivery App

How food delivery app user accesses the app	Frequency	Percent
From the app downloaded on my phone	338	88.3
From an app downloaded on my desktop	14	3.7
From an app downloaded on my tablet	4	1.0
From an app downloaded on my laptop	7	1.8
From the restaurant website	4	1.0
From either a downloaded app or the restaurant website	16	4.2
Total	383	100

Table 27: Overall App Satisfaction

Overall Satisfaction with Mobile Food App	Frequency	Percent
Very satisfied	104	27.2
Moderately satisfied	228	59.5
Neither satisfied nor dissatisfied	32	8.4
Moderately dissatisfied	15	3.9
Very dissatisfied	2	0.5
Total	381	99.5
Missing	2	0.5
	383	100

Service fees can be very specific to individual delivery providers and can vary based on use, time of day and promotions. As such, Table 28 shows mobile food delivery app users are paying an average of $4-6 to use the app according to 58% of the respondents surveyed. Nearly 30% state they are paying less than $3.00 on average in service fees, while 10% are paying $7-9 and 5% are paying over $10.

Table 28: Service Fee

Avg. Service Fee	Frequency	Percent
Less than $3.00	102	26.6
$4.00-$6.00	223	58.2
$7.00-$9.00	39	10.2
$10.00 and over	19	5.0
Total	383	100

After the completion of the descriptive analysis, structural equation modeling (SEM), using the partial least square's (PLS) approach is used to analyze the main study's findings. The SmartPLS software version 4 modeled and measured all constructs and

indicators included in the survey. All aspects of the model utilized a reflective approach, which is consistent with the way the scales employed in this research were originally developed and validated.

The analysis of the main study findings includes the assessment of the loadings to determine which variables have loadings of .70 or greater, indicating that the construct explains more than 50% of the indicator's variance thereby proving adequate reliability. Table 29 shows low loadings for the engagement and loyalty constructs, leading to the removal of two items for each of the constructs.

Table 29: Items Removed from Main Study

Construct	Item	Low Loadings
ENG	ENG3	.679
	ENG4	.647
LOY	LOY5	.644
	LOY6	.650

ENG=engagement, LOY=loyalty

The assessment of the reflective model begins with internal consistency reliability which typically includes Cronbach's alpha and composite reliability. The Cronbach's alpha also measures internal consistency/reliability, but typically produces lower values than composite reliability. Specifically, Cronbach's alpha is a less precise measure of reliability, as the items are unweighted. In contrast, with composite reliability, the items are weighted based on the construct indicators' individual loadings and, hence, this reliability is higher than Cronbach's alpha. While Cronbach's alpha may be too conservative, the composite reliability may be too liberal, and the construct's true

reliability is typically viewed as within these two extreme values (Hair, 2019). Based upon

the forementioned both are included in the analysis and illustrated in Table 30.

Table 30: Main Study Summary Results (Part 1)

Latent	Label	Indicators	Main Study Results Summary for Reflective Measurement		
			Internal Consistency Reliability		Discriminant Validity
			Composite Reliability	Cronbach's Alpha	
Aesthetics	AES1	The design is original	0.901	0.863	HTMT confidence interval does not include 1
	AES2	The design is creative			
	AES3	The design is fascinating			
	AES4	The app represents the latest in technology			yes
	AES5	The app uses different features than competitors			
Attractiveness	ATT1	The app is friendly	0.910	0.878	yes
	ATT2	The app is pleasing			
	ATT3	The app is welcoming			
	ATT4	The app is fun to use			
	ATT5	The app keeps my attention			
Emotional Value	EMO1	I feel gratified	0.878	0.815	yes
	EMO2	I feel fulfilled			
	EMO3	I feel happy			
	EMO4	I feel joyful			
Usability	USA1	The design makes it easy	0.876	0.811	yes
	USA2	The design makes it convenient to use			
	USA3	The design is clear			
	USA4	The design is practical			
	USA5	The design makes it easy to navigate			
Engagement	ENG1	I have an emotional connection to this app	0.922	0.888	yes
	ENG2	I share recommendations from this app on social media			
	ENG5	I write commentaries about my experience			
	ENG6	I am always learning about new things from the app that helps me to make better decisions in my life.			
Personal Innovativeness	PII1	If I hear of a new technology, I look for ways to experiment with it	0.920	0.887	yes
	PII2	Among my peers, I am usually the first to try new technnologies			
	PII3	I like to experiment with new technnologies			
	PII4	If someone recommends a technology I tend to try it			
Loyalty	LOY1	I will use the app in the future	0.944	0.926	yes
	LOY2	I will use the app again			
	LOY3	I encourage friends and relatives to use the app			
	LOY4	I say positive things about the app			

In addition, discriminant validity is assessed to empirically prove distinctiveness

from one construct to other constructs in the structural model. In a PLS-SEM analysis,

discriminant validity is established when the HTMT criterion, for any pair of constructs,

shows a value of 0.90 or less (ideally, 0.85 or less). Henseler et al., 2015 proposed a

threshold value of 0.90 for structural models with constructs that are conceptually very

similar. This criterion provides evidence that there is sufficient discriminant validity and

that the measurement of any pairs of constructs can be argued to be sufficiently different

from one another, put differently, there is no question of simularity between a pair of

constructs and they are therefore distinct from one another.

Table 31, illustrates the research results, showing for any pair of constructs in the

research model, the HTMT criterion was below the 0.85 threshold, therefore providing

evidence of discriminant validity. In addition to these guidelines, bootstrapping can be applied to test whether the HTMT value is significantly different from 1.00 (Henseler et al., 2015) or a lower threshold value such as 0.85 or 0.90. As evidenced above in Table 30, HTMT is reported to not include 1 for all the listed variables.

Table 31: Discriminant Validity (HTMT)

Constructs	Aesthetics	Attractiveness	Emotional Value	Engagement	Loyalty	Personal Innovativeness	Usability	Personal Innovativeness x Engagement
Aesthetics								
Attractiveness	0.783							
Emotional Value	0.647	0.674						
Engagement	0.617	0.470	0.471					
Loyalty	0.628	0.805	0.723	0.445				
Personal Innovativeness	0.437	0.399	0.340	0.393	0.464			
Usability	0.484	0.733	0.506	0.168	0.732	0.270		
Personal Innovativeness x Engagement	0.152	0.160	0.148	0.294	0.159	0.062	0.169	

The next step is evaluating the convergent reliability, which is typically illustrated through the outer loadings of the indicators and the average variance extracted (AVE) as cited by Hair et al., 2019. Values in the .70-.90 range are considered satisfactory to good while values closer to 1.0 (i.e., .95) are concerning because they signal redundancy and weaken construct reliability (Hair et al,.2019). The results show all scores are satisfactory, the remaining loadings all above .70 and acceptable AVEs of over .64 for all reflectively measured variables, which is above the critical threshold of .70.

Table 32: Main Study Summary Results (Part 2)

Latent	Label	Indicators	Main Study Results Summary for Reflective Measurement	
			Convergent Validity	
			Indicator Reliability (Loadings)	AVE
Aesthetics	AES1	The design is original	0.845	
	AES2	The design is creative	0.850	
	AES3	The design is fascinating	0.812	0.647
	AES4	The app represents the latest in technology	0.754	
	AES5	The app uses different features than competitors	0.758	
App Apeal (Attractiveness)	ATT1	The app is friendly	0.758	
	ATT2	The app is pleasing	0.83	
	ATT3	The app is welcoming	0.859	0.669
	ATT4	The app is fun to use	0.857	
	ATT5	The app keeps my attention	0.781	
Positive Emotional Value	EMO1	I feel gratified	0.841	
	EMO2	I feel fulfilled	0.775	0.744
	EMO3	I feel happy	0.914	
	EMO4	I feel joyful	0.913	
Usability	USA1	The design makes it easy	0.907	
	USA2	The design makes it convenient to use	0.878	
	USA3	The design is clear	0.875	0.772
	USA4	The design is practical	0.850	
	USA5	The design makes it easy to navigate	0.881	
Engagement	ENG1	I have an emotional connection to this app	0.821	
	ENG2	I share recommendations from this app on social media	0.836	0.644
	ENG5	I write commentaries about my experience	0.703	
	ENG6	I am always learning about new things from the app that help me to make better decision in my life	0.842	
PII	PII1	If I hear of a new technology, I look for ways to experiment with it	0.892	
	PII2	Among my peers, I am usually the first to try new technnologies	0.828	0.749
	PII3	I like to experiment with new technnologies	0.892	
	PII4	If someone recommends a technology I tend to try it	0.847	
Loyalty	LOY1	I will use the app in the future	0.843	
	LOY2	I will use the app again	0.808	0.639
	LOY3	I encourage friends and relatives to use the app	0.745	
	LOY4	I say positive things about the app	0.798	

In summary, all constructs in the research model exhibited sufficient reliability (Table 30), discriminant validity (based on the HTMT criterion, Table 31), and convergent validity (AVEs, Table 32), as well as loadings which were sufficiently high for each item on their intended construct (Table 29). As a result, the measurement portion of the research model is deemed satisfactory and it is possible to use this measurement model as the basis for the analysis of the structural relationships of interest.

The initial measurement model in Figure 2, displays the relationship between associated loadings of the exogenous, endogenous and control variables. The model depicts all loadings prior to the removal of low loading variables.
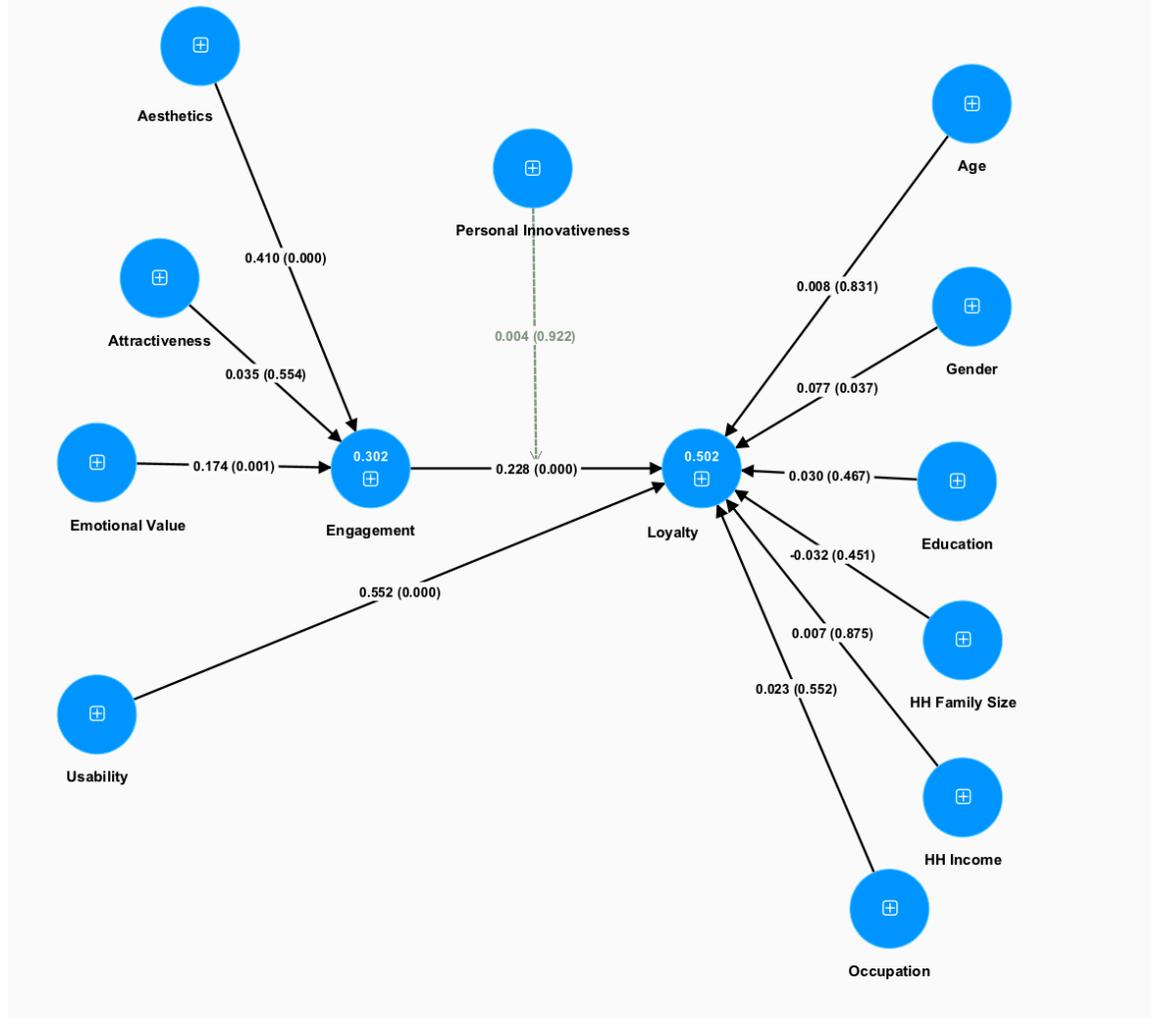
Figure 2: Main Study with Initial loadings and Control Variables

Figure 2 shows the results of the structural portion of the research model after the removal of low loading items. The reported values are the standardized paths between the different constructs (and the control variables) in the research model. The values within the parentheses are the p-values for the associated path obtained from a bootstrapping calculation using 5,000 replications. Only one control variable, gender, has a significant relationship to loyalty with a p-value of .0037, shown in Figure 2. Out of 383 participants, males made up 54% (207) and 46% (167) were women, and 4% (8) non-binary, the significant and positive relationship between gender and loyalty shows that women are

slightly more loyal to food delivery apps than men. Figure 3 is included to show the structural model with the gender control variable only. In addition, Table 33 outlines the path coefficients and captures the relationships between tested constructs and collected statistics for the structural model's assessment.
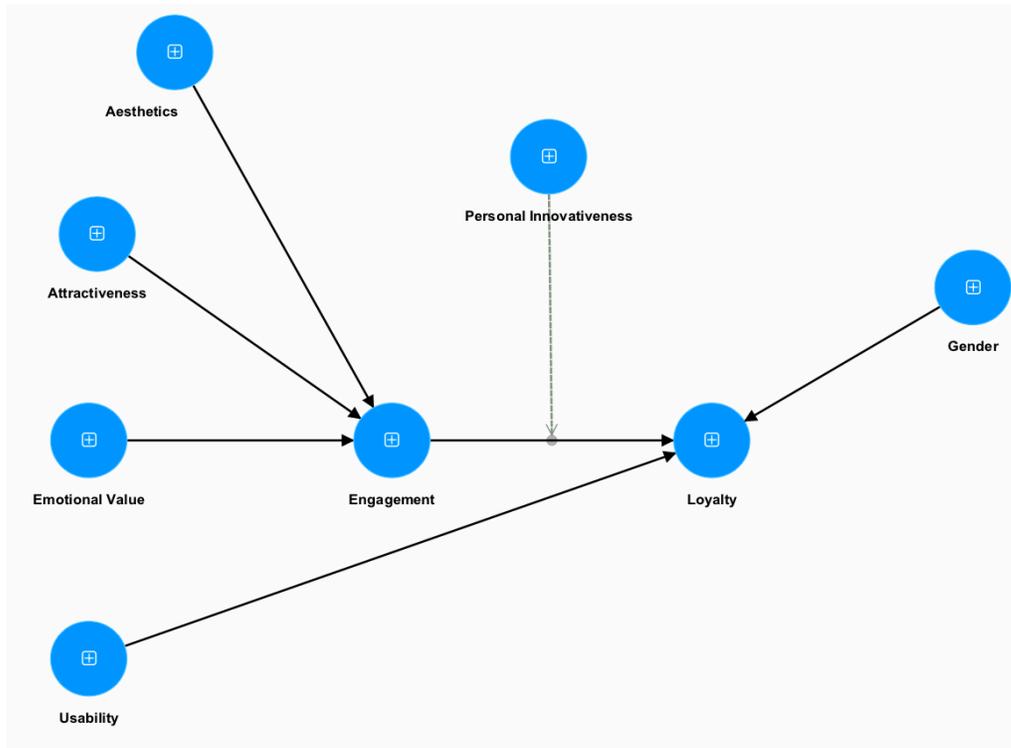
Figure 3: Final Measurement Model with The Gender Control Variable

Table 33: Path Coefficients

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Aesthetics -> Engagement	0.410	0.411	0.061	6.736	0.000
Attractiveness -> Engagement	0.035	0.039	0.059	0.592	0.554
Emotional Value -> Engagement	0.174	0.175	0.052	3.383	0.001
Engagement -> Loyalty	0.222	0.222	0.049	4.508	0.000
Gender -> Loyalty	0.079	0.081	0.036	2.207	0.027
Personal Innovativeness -> Loyalty	0.200	0.202	0.047	4.278	0.000
Usability -> Loyalty	0.555	0.554	0.043	12.912	0.000
Personal Innovativeness x Engagement -> Loyalty	0.008	0.007	0.040	0.199	0.843

Main Hypotheses Study Summary:

The executed research examined the relationship between the app design constructs and their relationship to engagement and loyalty. The summarized structural model with loadings and path coefficients but without control variables is shown in Figure 4. In addition, Table 34 provides the hypotheses summary based on the path coefficients in Table 30, illustrating that four of the six relationships are supported.
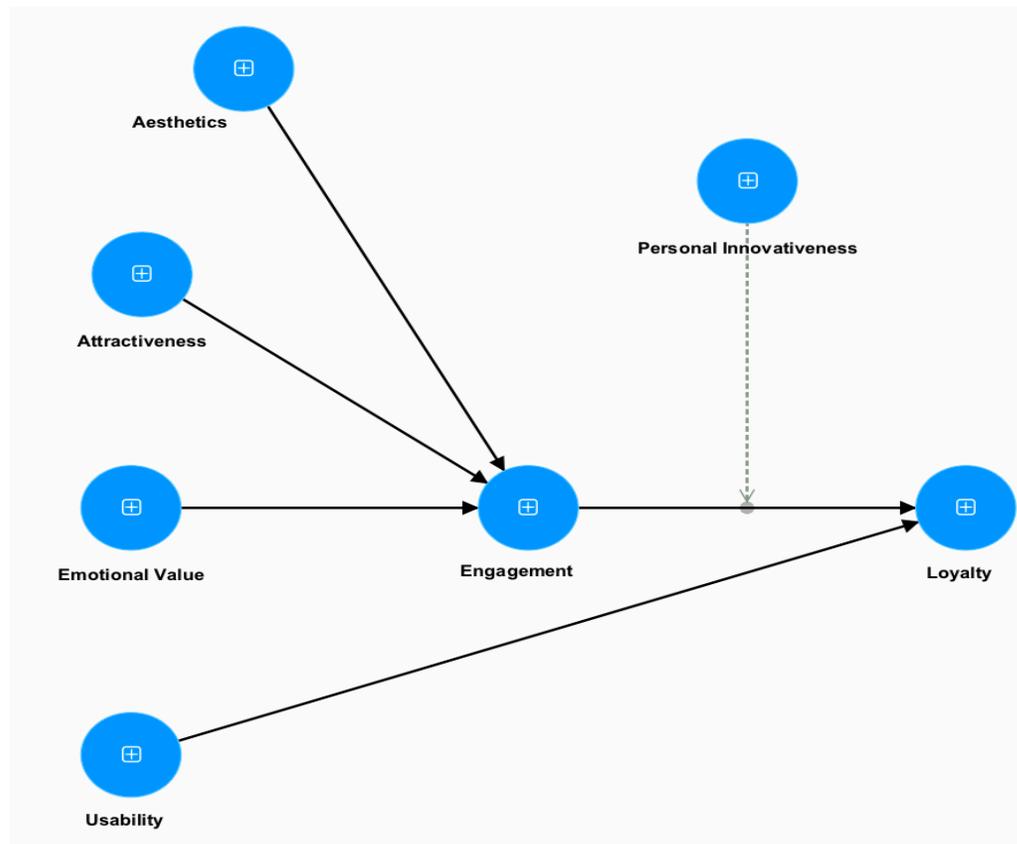
Figure 4: Final Structural Measurement Model

Table 34: Hypotheses Summary

Hypotheses	Description	P-value
H1	Expressive Aesthetics positively affects engagement	Supported
H2	App Appeal (Attractiveness) positively affects engagement	Not Supported
H3	Positive Emotional Value positively affects engagement	Supported
H4	Usability positively affects loyalty	Suppported
H5	Engagement positively affects loyalty	Supported
H6	Personal innovativeness (PI) has a negative moderating effect on the relationship between engagement and loyalty of mobile food delivery apps such that when PI is high the loyalty with food delivery apps would be weaker than when PI is lower.	Not Supported

Hypothesis H1 Expressive aesthetics positively affects engagement, predicted a positive relationship between aesthetic qualities, like originality or creativity, and the relationship to engagement. The results show a positive and significant relationship between expressive aesthetics and engagement ($b = 0.410, p < .000$). As such, as user perception of aesthetic qualities increases so does engagement with the mobile food delivery app.

Hypothesis H2 examined the relationship between the internal feelings toward the app's interface (app appeal) and engagement and predicted a positive relationship would exist between app appeal attributes, like friendly, enjoyable, and engaging. The results show no significant relationship exists between app appeal and engagement ($b = .035, p = .554$).

Hypothesis H3 examined the relationship that positive emotional values such as gratitude, fulfillment and joy could have on engagement. H3 predicted a positive relationship between positive emotional value and engagement. The results show a positive and significant relationship between expressive aesthetics and engagement ($b = .174, p$

< .001). As such, as a user's positive emotional value increases so does engagement with the mobile food delivery app.

Hypothesis H4 and H5 predicted positive relationships directly between usability and loyalty and engagement and loyalty. First, H4 examined the relationship between usability, which measured attributes like ease of use and convenience, to loyalty. The results confirm a positive and significant relationship exists between usability and loyalty ($b = 0.555$, $p < .000$). Consequently, as usability attributes increases so will loyalty to the mobile food delivery app. H5 examined the relationship between engagement and loyalty. The results confirm a positive and significant relationship between engagement and loyalty ($b = 0.222$, $p < .000$). As such, as user continual interactions (engagement) increases so will loyalty to the mobile food delivery app.

Lastly, Hypothesis H6 examined if a moderating effect exists with personal innovativeness (PI) on the relationship between engagement and loyalty. H6 predicted personal innovativeness (PI) had a negative moderating effect on the relationship between engagement and loyalty to a mobile food delivery app, such that when PI is high the loyalty with food delivery apps would be weaker than when PI is lower. The results show no significant moderating effect exists for personal innovativeness to impact the relationship between engagement and loyalty ($b = 0.008$, $p < .843$).

In this chapter, participants were recruited and given a survey during the pilot phase to respond to questions, providing an opportunity to test questions for validity and reliability. The pilot allowed for question refinement and a chance to increase the sample size from 150 to 383 participants to support further statistical analysis. Demographic information informed reporting and supported control variables for both surveys. Data on

mobile food delivery app usage helped to eliminate unqualified respondents. Uber Eats and DoorDash are the most used and preferred brands, falling in the number 1 and 2 positions; however, they are interchangeably between the pilot and the main study.

For the pilot, a confirmatory factor analysis allowed for the removal of low-loading items replaced and with new items to strengthen the number of items per construct. Items in the main study undergo a panel of validity and reliability tests conducted to determine the legitimacy of the structural model. After the structural model is proven sound, a thorough statistical evaluation includes p-values, path coefficients, and hypothesis testing. As mentioned above, the process supported 4 of the six hypotheses tested during this research and answered the posited research question: What factors of innovative app design lead to loyalty for U.S.-based mobile food delivery services?

Based on the findings, innovative design attributes, aesthetics, emotional value, and usability all impact loyalty to mobile food delivery apps. Aesthetics and emotional value influence heightened engagement, leading to loyalty. Personal innovativeness, introduced as a moderator to the engagement-loyalty relationship, does not negatively influence the engagement-loyalty relationship as personal innovativeness increases. However, a person's level of innovativeness does directly impact loyalty.

VI: DISCUSSION AND CONCLUSION

This research is motivated by the vast improvements in delivery innovation and its undeniable impact on society and various industries. Among these services, food delivery stands out as it is transactional and time-sensitive, mainly local, small business-focused (restaurants), and logistically based. Customers can order ready-to-eat meals from a diverse range of restaurants, while restaurant owners can generate revenue from customers who may never visit their physical establishment. Meanwhile, delivery drivers have the flexibility to earn an income when and where they like. The growing significance of the delivery service places the app at the center of service performance. The app, in many ways, becomes the brand to customers. With multiple food delivery providers in the U.S. market, competition, customer loyalty, and profitability can change growth and performance. A prime example of this is the rapid expansion of DoorDash, led by their investment in marketing, partnerships, and technology, which includes their app interface and delivery logistics, compared to GrubHub. GrubHub was slower to expand and invest and less aggressive in their marketing efforts, impacting their performance and prominence in the delivery industry. DoorDash now has the market share that GrubHub had in 2018.

These changing dynamics reflect how impactful the speed of innovation is on company performance. DoorDash's strategic moves enabled it to capture GrubHub's market share, leading DoorDash to obtain the highest market share among the major food delivery players. DoorDash, as of February 2024, is stated to have 66% of the share of sales, with Uber Eats at 23%. Uber Eats has followed DoorDash's footsteps by acquiring Postmates, which allowed them to gain an additional 2% of the share of sales for 25%. The

remaining food delivery providers, including GrubHub, hold less than a 10% share of sales (Kaczmarski, 2024). To meet the profitability pressure, market consolidation among delivery rivals continues, as do partnerships with aligned businesses like grocers and retail. Other cost-cutting measures include operational costs, where remedies have ranged from layoffs to minimizing driver churn. Lastly, the customer has become less loyal as companies incentivize customers through discounts and subscriptions to use their platform. Grubhub's former CEO cited "promiscuous customers" as hindering his company's growth.

Therefore, maintaining customers is a central theme for food delivery company leaders. The research focuses on addressing the app's increasing role amidst the competitive landscape of food delivery apps. Earlier works, have proven that design contributes to the attitudes and perceived value of the food app. Also, design can serve as a differentiator from other food providers (Bloch, 1995). Therefore, this research seeks to understand the role and influence of design attributes, specifically innovative design attributes, on performance outcomes like engagement and loyalty. As such, this research aims to understand the relationship between innovative design attributes and engagement followed by engagement's relationship to loyalty. Understanding, if design impacts the engagement and loyalty of food delivery apps, will influence future app development.

The app serves as the customer's primary touchpoint. It represents more than just a platform to conduct a food delivery transaction; it also represents the company's values, essence, and customer experience. Through empirical analysis and user feedback, this study acknowledges the critical role of the app in its function and its significance to the brand's identity. Although an understudied area, design innovation reflects previous

research's acknowledgment of what has become a critical area for company survival. Moon (2012), who coined the term, defined design innovation as new or substantially improved product design and features created to satisfy customer needs. This definition and its corresponding framework include aesthetics, features, and emotional attributes, which form the conceptualization of this research. For this research, expressive aesthetics and app appeal are measures of the aesthetic attribute. Expressive aesthetics focuses on creativity and originality, while a newer adaptation of the term attractiveness (app appeal) measures the user's internal feelings about the app's interface. The well-studied usability construct represents the features/function attribute. It measures the functional performance of the app, while emotional value directly matches the emotional attribute by conveying sentiments felt during or after app use.

Consequently, the combination of these attributes contributes to the innovative design construct. Engagement and loyalty are heavily studied constructs; however, they are less prominent in design research. They are the final constructs and serve as mediator and dependent variables. To conclude the model, a personal trait construct, personal innovativeness, was added as a moderator to determine the role of the user's level of comfort and experience with technology on the engagement-loyalty relationship.

The empirical assessment led with the Stimulus-Organism-Response (S-O-R) framework (Mehrabian and Russell, 1974), which solidified the formation of the research model and provided a well-studied framework; however, it has only recently focused on smartphone apps where app attributes were used to comprehend their influence on user's engagement with health and fitness apps (Ali et al., 2021). The S-O-R model offers a parsimonious way to understand the variables in the research model by organizing the relationship between

variables, making it a suitable framework for its ability to draw upon the interplay between stimuli, user interaction, and behavioral responses. The psychology-based S-O-R framework seamlessly depicts the relationship necessary between external and internal interactions to garner a response or action. For this research, the design innovation attributes represent the stimuli; the organism is the user's engagement with the app, and the response is a loyal behavior with the app itself in the form of repeated use. The psychological underpinnings provided by the S-O-R framework have contributed to marketing, behavioral sciences, and user experience design. S-O-R allows marketers and developers to understand the importance of identifying and prioritizing which stimulus will elicit desirable responses to yield loyalty behaviors.

The S-O-R framework proves to be a sound theory for this research, validating the relationships proposed by the theory; also, its contextual applicability to mobile apps further endorses S-O-R's suitability to explain the interplay between variables. Relating the theoretical with the empirical findings allows the learning from this study to highlight S-O-R's practical interpretation by giving way to design strategies aimed at garnering customer loyalty. Following the empirical findings, the statistical results confirm the theory's validity, which provide quantitative evidence of specific design attributes and their context to loyalty. Specifically, the significant coefficient of usability $b = 0.555$, $p < .000$) underscores the essential role usability plays in innovation design. The design must accomplish its primary purpose of enabling the user to order food quickly and clearly above all else. Second is the app's expressive aesthetic ($b = 0.410$, $p < 0.000$). Expressive aesthetics allow users to experience original and creative design qualities. Next, positive emotional value ($b = .174$, $p < 0.001$) reinforces that the app must leave users with a

positive emotional encounter during or after use. Design should leave users functionally and emotionally satisfied with their experience. The use of the app to deploy a delivery service successfully, if enjoyed, motivates use and pulls the user toward the app repeatedly. The last attribute to discuss is app appeal (attractiveness), which was not supported (b =.035, p <0.554), illustrates that the user's feelings about the app's interface, such as is the interface considered friendly or pleasing, are less critical to design innovation.

The moderator, personal innovativeness, and its relationship to engagement and loyalty was unsupported in the findings. However, this finding can be considered as positive considering an increasingly digitalized world. Consequently, a user's perceived level of innovativeness will not hinder or limit engagement with a food delivery app but could mitigate loyalty. Personal innovativeness moderating effect is (b =.08, p <0.883) and does not have impact on the engagement to loyalty relationship, however personal innovativeness does have a direct relationship to loyalty (b = 0.200, p < 0.000). So, the higher the personal innovativeness of the user, the loyalty to the food delivery app is weaker than for a user with lower personal innovativeness trait. Therefore, marketers and developers can remain inclusive in their design to appeal to broad range of audiences that vary in technological prowess to forge engagement; however, thoughtful design and marketing consideration should support users who are more prone to innovation, so they do not grow bored and not return to the app. The highly innovative user can remain engaged through interactions with new features/functions on the app; even when testing new features, the more innovative user could be an essential evaluator before

fully adopting new features. In addition to, features, discounts, and loyalty programs could engage the highly innovative user to sustain engagement with the app.

As evidenced in extant research, engagement is a driver of loyalty, as shown in this study (b = 0.222, p < 0.000). Engagement is an antecedent to loyalty, as engagement elevates the positive regard for the brand/product it encourages repeated use. Worth noting is that women are slightly more loyal ((b = 0.079, p < 0.027) than men, making this an interesting discussion point for future studies. Overall, the findings reinforce the importance of multi-varied attributes, including aesthetics, function and emotional qualities that engender engagement and loyalty in digital platforms like food delivery apps.

Limitations and Future Research Directions

Limitations

Just like other research, inherent and explicit limitations result from the selection and exclusion of variables. The initial decision to focus on food delivery using an app limit and consequently leaves out the rising number of additional types of deliveries made possible by using an app, like groceries, packages, and medicine. Therefore, the implications found from this study are not generalizable to other product delivery categories and delivery channels. Further, with a primary focus on the most prominent mobile food delivery services, this inherently excludes any regional, restaurant, or smaller providers; the absence of less prominent providers may showcase different responses to research questions. Supporting local and small businesses has become a consumer value that can impact perceptions and loyalty behaviors and elicit distinct responses from those gathered in this study. Additionally, including the most prominent mobile food delivery providers with brand recognition could elicit different reactions to design attributes than

smaller less recognizable brands, which further limits applicability of findings to smaller less recognized brands.

Second, this study is one of a few conducted in the United States and offers only a domestic perspective. Many extant studies are not U.S.-based; therefore, their results cannot inform the U.S. market; the reverse is also true: the U.S.-based results from this research may not reflect the perspectives of other global markets. Third, this research is brand-agnostic and focuses on the overall category of mobile food delivery providers, limiting any findings' association to a specific food delivery app provider. Fourth, the personal innovativeness variable is self-reported and has limitations of bias and variability. Fifth, the loyalty measure does not include word of mouth (WOM) construct as part of the evaluation, which could be a part of the loyalty construct. By narrowing loyalty, this study focuses on the action of repeated use rather than including social referrals. Lastly, brand influence and customer experience extend beyond the app experience; these aspects are not included in this research but are known to impact loyalty.

Future Research

Due to the outlined limitations, future research could consider the following: First, future research could broaden the scope of the delivery experience to include the offline activity, including the food and the order delivery process. Extending the experience beyond the app would depict a comprehensive view of the delivery experience, which could impact design innovation attributes, engagement, and loyalty. Second, evaluating brand and brand preferences' role in engagement and loyalty would pivot the focus from the category level findings to individual users' reaction to their preferred brand approach to design innovation. Conversely, future studies should consider new entrants and smaller,

less known food delivery providers to discover differences with more notable brands of mobile food delivery providers.

Third, an area of research that holds significant potential is exploring gender differences in design innovation attributes. While gender differences were addressed to some extent in this study as a control variable, a more comprehensive study integrating gender within the model as a moderator could offer invaluable insights into gender preferences concerning design and loyalty. Fourth, while personal innovativeness as a moderator was not supported, evaluating other personality traits, such as personality types or usage profiles, could provide rich customer segmentation and loyalty insights. Lastly, given the understudied nature of design innovation, it would be beneficial to study more types of design variables and their impact on engagement and loyalty. For instance, measures of emotion and feelings, less commonly covered in design, could assist in building design innovation knowledge.

Contributions

Theoretical Implications

This study embodied and extended the work started by Moon's (2012) framework. Moon's work helped identify design innovation by determining the relevancy of aesthetics, features, and emotional value. Moon (2012) provided a framework that facilitated the evaluation of variables that align with the categories outlined by the framework, allowing for the models to be tested, supported, and further defined. The aspects included measure aesthetics, feelings toward the interface, positive emotional value, and the functional performance of the service; all the variables represent Moon's design innovation definition.

Further, this study has supported the relationships explained by the S-O-R model and afforded an additional application of technology, specifically mobile food delivery apps.

Overall, these research findings add to an understudied area of design innovation and explicitly focus on design innovation in food delivery apps. The addition of this work to the body of knowledge impacts the mobile food delivery category as it can aid in the development of theoretically based designs identified from the relationships proven in this research. Also, unlike other common research informing the intention to adopt technology, this study focuses on post-app adoption in the U.S. market and does not use a technology-first approach. With a purview of currently adopted apps, this research can provide insights into the value of design innovation for customer retention from the user's perspective.

Managerial Implications

This study reinforces the importance of product design in relation to app usage for practitioners. Specifically, this research can assist practitioners in knowing which attributes of innovative design contribute to user engagement. For companies that use design differentially, it will help them by allowing them to have a current review of the attributes that can affect engagement and loyalty in a way that can shape a defense for competitors. For researchers, it adds to the limited body of design innovation knowledge, especially for app design. This increased knowledge reinforces the application of newer constructs in measuring engagement, such as app appeal and positive emotional value. With this type of research, Marketers and User Experience Professionals can better recognize the multidimensional aspects of design, including the visual, functional, and emotional in product development efforts to lead to better performances concerning engagement and loyalty. The success of design innovation profoundly affects other product areas, such as

product differentiation, emotional value, user experiences, and long-term engagement/loyalty.

The multidisciplinary nature of this research topic, including technology, design, and marketing, increases the applicability of findings to inform the development of mobile delivery apps that engender engagement leading to app loyalty. With multidisciplinary learning, mobile food delivery apps can benefit by enhancing design innovation and potentially enhance knowledge that provides a competitive advantage.

LIST OF REFERENCES

Adams, Eric https://www.nyc.gov/assets/dca/downloads/pdf/workers/Delivery-Worker-Study-November-2022.pdf

Agarwal, R., & Prasad, J. (1998). A conceptual and operational definition of personal innovativeness in the domain of information technology. *Information systems research*, *9*(2), 204-215.

Ah, Buss, 1989. Personality as traits. Am. Psychol. 44 (11),1378-1388

Ahuja, Kabir, Vishwa Chandra, Lord Victoria and Peems, Curtis https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/ordering-in-the-rapid-evolution-of-food-delivery

Alagoz, S. M., & Hekimoglu, H. (2012). A study on tam: analysis of customer attitudes in online food ordering system. *Procedia-Social and Behavioral Sciences*, *62*, 1138-1143.

Alalwan, A. A. (2020). Mobile food ordering apps: An empirical study of the factors affecting customer e-satisfaction and continued intention to reuse. International Journal of Information Management, 50, 28-44.

Ali, F., Terrah, A., Wu, C., Ali, L., & Wu, H. (2021). Antecedents and consequences of user engagement in smartphone travel apps. Journal of Hospitality and Tourism Technology, 12(2), 355–371.

Alkawsi, G., Ali, N. A., & Baashar, Y. (2021). The moderating role of personal innovativeness and users experience in accepting the smart meter technology. Applied Sciences, 11(8), 3297.

Al-Nabhani, K., Wilson, A., & McLean, G. (2022). Examining consumers' continuous usage of multichannel retailers' mobile applications. Psychology & Marketing, 39(1), 168-195.

Atkinson, M., & Kydd, C. (1997). Individual characteristics associated with World Wide Web use: an empirical study of playfulness and motivation. ACM SIGMIS Database: the DATABASE for Advances in Information Systems, 28(2), 53-62.

Babin, B. J., W.R. Darden, and M. Griffin, "Work and/or fun: Measuring hedonic and utilitarian shopping." Journal of Consumer Research, Vol. 20, No. 4: 644-56, 1994.

Baek, T. H., & Yoo, C. Y. (2018). Branded app usability: Conceptualization, measurement, and prediction of consumer loyalty. Journal of Advertising, 47(1), 70-82

Bagayogo, F. F., Lapointe, L., & Bassellier, G. (2014). Enhanced use of IT: A new perspective on post-adoption. Journal of the Association for Information Systems, 15(7), 3

Beardsley, Monroe C. (1982). The aesthetic point of view: selected essays. Ithaca, N.Y.: Cornell University Press. Edited by Michael J. Wreen & Donald M. Callen

Bendixen, M., K.A. Bukasa, and R. Abratt, "Brand equity in the business-to-business market", Industrial Marketing Management, Vol. 33, No. 2: 371-380, 2004.

Bhattacherjee, A., Limayem, M., & Cheung, C. M. (2012). User switching of information technology: A theoretical synthesis and empirical test. Information & Management, 49(7-8), 327-333

Bloch, P. H. (1995). Seeking the ideal form: Product design and consumer response. Journal of marketing, 59(3), 16-29.

Bonhomme, J., G. Christodoulides, and C. Jevons, "The impact of user-generated content on consumer-based brand equity", The 6th Thought Leaders International Conference on Brand Management, Switzerland, April 18-20, 2010.

Borja de Mozota, B. (2002). Design and competitive edge: A model for design management excellence in European SME's

Borkenau, Peter, Müller, Burkhard, 1991. Breadth, bandwidth, and fidelity of Personality. descriptive categories. Eur. J. Personal. 5 (4), 309-322

Bowden, J.L.H. (2009), "The process of customer engagement: a conceptual framework", Journal of Marketing Theory and Practice, Vol. 17 No. 1, pp. 63-74.

Brangier, E., & Desmarais, M. C. (2013). A set of criteria to assess motivation and persuasion of e-learning applications. IWEPLET 2013.

Brodie, R.J., Ilic, A., Juric, B. and Hollebeek, L. (2013), "Consumer engagement in a virtual brand community: an exploratory analysis", Journal of Business Research, Vol. 66 No. 1, pp. 105-114

Brodie, R., Hollebeek, L.D., Ilic, A. and Juric, B. (2011), "Customer engagement: conceptual domain, fundamental service marketing", Journal of Service Research, Vol. 14 No. 3, pp. 252-271

Buchanan, T. (1985). Commitment and leisure behavior: A theoretical perspective. Leisure Sciences, 7(4), 401-420.

Burton-Jones, A., & Grange, C. (2013). From use to effective use: A representation theory perspective. Information systems research, 24(3), 632-658.

Carte. T, Heinzl A., Urquhart C. (Eds.), Proceedings of the 36th international conference on information systems (ICIS 2015), Association for Information Systems, AIS Electronic Library (AISeL), Atlanta, GA, USA (2015)

Casaló, L. V., Flavián, C., & Guinalíu, M. (2008). The role of satisfaction and website usability in developing customer loyalty and positive word-of-mouth in the e-banking services. International journal of bank marketing, 26(6), 399-417.
Chang, H.-J., Eckman, M., & Yan, R.-N. (2011). Application of the stimulus-organism-response model to the retail environment: The role of hedonic motivation in impulse buying behavior. The International Review of Retail, Distribution and Consumer Research, 21(3), 233–249.

Chapman, P. M. (1997). Models of engagement: Intrinsically motivated interaction with multimedia learning software (Doctoral dissertation, University of Waterloo).

Chapman, P., Selvarajah, S., & Webster, J. (1999, January). Engagement in multimedia training systems. In Proceedings of the 32nd Annual Hawaii International Conference on Systems Sciences. 1999. HICSS-32. Abstracts and CD-ROM of Full Papers (pp. 9-pp). IEEE

Chen, X., Huang, Q., & Davison, R. M. (2017). The role of website quality and social capital in building buyers' loyalty. International Journal of Information Management, 37(1), 1563-1574.

Cheng, Y. M. (2014). Exploring the intention to use mobile learning: the moderating role of personal innovativeness. Journal of Systems and Information Technology.

Cheung, Zheng, X., Lee, C. M. M. K., & Liang, L. (2015). Building brand loyalty through user engagement in online brand communities in social networking sites. Information Technology & People, 28(1), 90-106

Cho, M., Bonn, M. A., & Li, J. J. (2019). Differences in perceptions about food delivery apps between single-person and multi-person households. International Journal of Hospitality Management, 77, 108-116

Choi, B., & Kim, H. S. (2020). Customer-to-customer interaction quality, promotion emotion, prevention emotion and attitudinal loyalty in mass services. Journal of service theory and practice, 30(3), 257-276.

Crawford, M. C., and A. Di Benedetto. 2007. New products management (9th ed.). Boston: McGraw-Hill.

Csikszentmihalyi, M., & Csikzentmihaly, M. (1990). Flow: The psychology of optimal experience (Vol. 1990, p. 1). New York: Harper & Row.

Curry, David Business of App, May 24, 2023
https://www.businessofapps.com/data/food-delivery-app-market/

Cyr, D., Head, M., & Ivanov, A. (2006). Design aesthetics leading to m-loyalty in mobile commerce. Information & management, 43(8), 950-963

Davis, J. M., & Mun, Y. Y. (2012). User disposition and extent of Web utilization: A trait hierarchy approach. International Journal of Human-Computer Studies, 70(5), 346-363.
Deepak S. Kumar, Keyoor Purani, Shyam A. Viswanathan,
Influences of 'appscape' on mobile app adoption and m-loyalty,
Journal of Retailing and Consumer Services, Volume 45, 2018, Pages 132-142

Di Talia, E., Simeone, M., & Scarpato, D. (2019). Consumer behavior types in household food waste. Journal of cleaner production, 214, 166-172.

Ehrenfels, C. V. (1890). Über gestaltqualitäten. Vierteljahrsschrift für wissenschaftliche Philosophie, 14(3), 249-292.

Elsotouhy M. Mohammad, Ghonim A. Mohammad, Hamad, Thamir, Alasker & Mohamed A. Khashan (2022) Investigating Health and Fitness App Users' Stickiness, WOM, and Continuance Intention Using S-O-R Model: The Moderating Role of Health Consciousness, International Journal of Human–Computer Interaction

Eroglu, S. A., Machleit, K. A., & Davis, L. M. (2001). Atmospheric qualities of online retailing: A conceptual model and implications. Journal of Business
Research, 54(2), 177–184.

Fang, J., Zhao, Z., Wen, C., & Wang, R. (2017). Design and performance attributes Management, 37(4), 269-283. (

Fang, Y., Qureshi, I., Sun, H., McCole, P., Ramsey, E. and Lim, K.H. (2014), "Trust, satisfaction, and online repurchase intention: the moderating role of perceived effectiveness of e-commerce institutional mechanisms", MIS Quarterly, Vol. 38 No. 2, pp. 407-427.

Ferneley, E. H., & Sobreperez, P. (2006). Resist, comply or workaround? An examination of different facets of user engagement with information systems. European Journal of Information Systems, 15(4), 345-356.

Fling, B. (2009), Mobile Design and Development: Practical Concepts and Techniques for Creating Mobile Sites and Web Apps, O'Reilly Media.

Floh, A., & Treiblmaier, H. (2006). What keeps the e-banking customer loyal? A multigroup analysis of the moderating role of consumer characteristics on e-loyalty in the financial service industry. A Multigroup Analysis of the Moderating Role of Consumer Characteristics on E-Loyalty in the Financial Service Industry. (March 26, 2006).

Flynn, L. R. and R. E. Goldsmith, "A Validation of the Goldsmith and Hofacker Innovativeness Scale," Educational and Psychological Measurement, 53, (1993), 1105–1116.

Foroughi, B., Sitthisirinan, S., Iranmanesh, M., Nikbin, D., & Ghobakhloo, M. (2023). Determinants of travel apps continuance usage intention: extension of technology continuance theory. Current Issues in Tourism, 1-17.

Ghapanchi, A. H., Purarjomandlangrudi, A., McAndrew, A., & Miao, Y. (2020). Investigating the impact of space design, visual attractiveness and perceived instructor presence on student adoption of learning management systems. Education and Information Technologies, 25(6), 5053-5066.

Goethe, O., Salehzadeh Niksirat, K., Hirskyj-Douglas, I., Sun, H., Law, E. L. C., & Ren, X. (2019). From UX to engagement: connecting theory and practice, addressing ethics and diversity. In Universal Access in Human-Computer Interaction. Theory, Methods and Tools: 13th International Conference, UAHCI 2019, Held as Part of the 21st HCI International Conference, HCII 2019, Orlando, FL, USA, July 26–31, 2019, Proceedings, Part I 21 (pp. 91-99). Springer International Publishing.

Goldsmith, R. E., "Convergent Validity of Four Innovativeness Scales," Educational and Psychological Measurement, 46, (1986), 81–87.
——, "The Validity of a Scale to Measure Global Innovativeness," Journal Applied Business Res., 7, 2 (1991), 89–97.
—— and C. F. Hofacker, "Measuring Consumer Innovativeness" Journal Acad. Marketing Sci., 19, (1991), 209–221.

Hair, Joseph F, Risher, Jeffrey J; Sarstedt, Marko; Ringle, Christian M "When to Use and How to Report the Results of PLS-SEM." European business review. 31.1 (2019): 2–24. Web.

Handayani, P. W., Azzizah, S. F., & Annisa, A. (2022). The impact of user emotions on intentions to continue using online food delivery applications: the influence of application quality attributes. Cogent Business & Management, 9(1), 2133797.

Harary, F., & Lipstein, B. (1962). The dynamics of brand loyalty: A Markovian approach. Operations Research, 10(1), 19-40.

Hartman, R. S., The Hartman Value Profile (HVP): Manual of Interpretation Muskegon, MI: Research Concepts, 1973.

Hassenzahl, M., & Tractinsky, N. (2006). User experience-a research agenda. Behaviour & information technology, 25(2), 91-97.

Hauser, J., Tellis, G. J., & Griffin, A. (2006). Research on innovation: A review and agenda for marketing science. Marketing science, 25(6), 687-717

Henna Mäkinen, Elina Haavisto, Sara Havola & Jaana-Maija Koivisto (2022) User experiences of virtual reality technologies for healthcare in learning: an integrative review, Behavior & Information Technology, 41:1, 1-17

Henseler, J. and Sarstedt, M. (2013), "Goodness-of-fit indices for partial least squares path modeling", Computational Statistics, Vol. 28 No. 2, pp. 565-580.

Henseler, J., Ringle, C.M. and Sarstedt, M. (2015), "A new criterion for assessing discriminant validity in variance-based structural equation modeling", Journal of the Academy of Marketing Science, Vol. 43 No. 1, pp. 115-135.

Ho, M. H. W., & Chung, H. F. (2020). Customer engagement, customer equity and repurchase intention in mobile apps. Journal of business research, 121, 13-21.

Holbrook, M. B., "The nature of customer value: An axiology of services in the consumption experience", In Service Quality: New Directions in Theory and Practice, edited by R. Rust and R. L. Oliver. Thousand Oaks, CA: Sage, pp. 21-71, 1994.

Homburg, C., Schwemmle, M., & Kuehnl, C. (2015). New Product Design: Concept, Measurement, and Consequences. Journal of Marketing, 79(3), 41–56.

Hou, M., Ho, G., Arrabito, G. R., Young, S., & Yin, S. (2013). Effects of display mode and input method for handheld control of micro aerial vehicles for a reconnaissance mission. IEEE Transactions on Human-Machine Systems, 43(2), 149-160.

Hurt, H. T., K. Joseph, and C. D. Cooed (1997) "Scales for the Measurement of Innovativeness," Human Comm. Res., 4, (1977), 58–65.

Hsieh, S. H., Tseng, T. H., & Lee, C. T. (2022). Feeling psychologically close: examining the determinants of branded app engagement. Journal of Product & Brand Management, (ahead-of-print).

Hwang, G. (2019). Challenges for Innovative HRD in era of the 4th Industrial Revolution. Asian Journal of Innovation and Policy, 8(2), 288-301.

Ishak, F., & Abd Ghani, N. H. (2013). A review of the literature on brand loyalty and customer loyalty.

Jacoby, J., Chestnut, R. W., & Fisher, W. A. (1978). A behavioral process approach to information acquisition in nondurable purchasing. Journal of marketing research, 15(4), 532-544.

Jasperson, J., Carter, P. E., & Zmud, R. W. (2005). A comprehensive conceptualization of post-adoptive behaviors associated with information technology enabled work systems. MIS quarterly, 525-557.

J. J. Po-A Hsieh & Wei Wang (2007) Explaining employees' Extended Use of complex information systems, European Journal of Information Systems, 16:3, 216-227, DOI: 10.1057/palgrave.ejis.3000663

Jennings, M. (2002). What do good designers know that we don't? In Web-based instructional learning (pp. 235-241). IGI Global.

Jeon Joo-Eon (2023) The impact of XR applications' user experience-based design innovativeness on loyalty, Cogent Business & Management, 10:1

Jiaming Fang, Zhirong Zhao, Chao Wen, Kangas, E., & Kinnunen, T. (2005). Applying user-centered design to mobile application development. Communications of the ACM, 48(7), 55–59.

Johnson, K. K., Kim, H. Y., Mun, J. M., & Lee, J. Y. (2015). Keeping customers shopping in stores: interrelationships among store attributes, shopping enjoyment, and place attachment. The International Review of Retail, Distribution and Consumer Research, 25(1), 20-34.

Jung, Y. (2014). What a smartphone is to me: understanding user values in using smartphones. Information Systems Journal, 24(4), 299-321

Kaczmarski, Michael Feb 2024   https://secondmeasure.com/datapoints/food-delivery-services-grubhub-uber-eats-doordash-postmates/

Kangas, E., & Kinnunen, T. (2005). Applying user-centered design to mobile application development. Communications of the ACM, 48(7), 55–59.

Kiemute Oyibo, Ifeoma Adaji and Rita Orji (2018) The Interplay between Classical Aesthetics, Expressive Aesthetics and Persuasiveness in Behavior Modeling. 2018.

Kim, S., & Baek, T. H. (2018). Examining the antecedents and consequences of mobile app engagement. Telematics and Informatics, 35(1), 148-158

Kim. H.W, H. Chan C and Gupta, S. Value-based adoption of mobile internet: an empirical investigation, Decision Support Systems, vol. 43, no. 1, pp. 111-126, 2007.

Kim, Y. H., Kim, D. J., & Wachter, K. (2013). A study of mobile user engagement (MoEN): Engagement motivations, perceived value, satisfaction, and continued engagement intention. Decision support systems, 56, 361-370

Kim, Y. H., Lee, M. Y., & Kim, Y. K. (2011). A new shopper typology: Utilitarian and hedonic perspectives. Journal of Global Academy of Marketing, 21(2), 102-113.

Kim, M. K., Wong, S. F., Chang, Y., & Park, J. H. (2016). Determinants of customer loyalty in the Korean smartphone market: Moderating effects of usage characteristics. Telematics and Informatics, 33(4), 936-949.

Kirton, M. (1976). Adaptors and innovators: A description and measure. Journal of applied psychology, 61(5), 622.

Kline, R. B. (2011). Convergence of structural equation modeling and multilevel modeling. The SAGE handbook of innovation in social research methods, 562-589.

Kortum, P., & Sorber, M. (2015). Measuring the usability of mobile applications for phones and tablets. International Journal of Human-Computer Interaction, 31(8), 518-529.

Krey, N., Chuah, S. H. W., Ramayah, T., & Rauschnabel, P. A. (2019). How functional and emotional ads drive smartwatch adoption: The moderating role of consumer innovativeness and extraversion. Internet Research, 29(3), 578-602.

Laurel, B. (1993). Computers as Theatre, 1993. NY: Addison-Wesley, 127.

Lavie, T., & Tractinsky, N. (2004). Assessing dimensions of perceived visual aesthetics of web sites. International journal of human-computer studies, 60(3), 269-298.

Lee, C. K., Yoon, Y. S., & Lee, S. K. (2007). Investigating the relationships among perceived value, satisfaction, and recommendations: The case of the Korean DMZ. Tourism management, 28(1), 204-214.

Lederer, A. L., Maupin, D. J., Sena, M. P., & Zhuang, Y. (2000). The technology acceptance model and the World Wide Web. Decision support systems, 29(3), 269-282

Leonard-Barton, D. and I. Deschamps, "Managerial Influence in the Implementation of New Technology," Management Sci., 34, 10 (1988), 1252–1265.

Limayem, M., Hirt, S. G., & Cheung, C. M. (2007). How habit limits the predictive power of intention: The case of information systems continuance. MIS quarterly, 705-737.

Lin, J. C. C. (2007). Online stickiness: its antecedents and effect on purchasing intention. Behaviour & information technology, 26(6), 507-516.

Liu, Y. 2003. Engineering aesthetics and aesthetic ergonomics: Theoretical foundations and a dual-process research methodology. Ergonomics 46: 1995.

Mahajan, R., & Shneiderman, B. (1997). Visual and textual consistency checking tools for graphical user interfaces. IEEE Transactions on software engineering, 23(11), 722-735

Mahlke, S. (2005, September). Understanding users' experience of interaction. In Proceedings of the 2005 annual conference on European association of cognitive ergonomics (pp. 251-254).

Marakas, G. M., & Hornik, S. (1996). Passive resistance misuse: overt support and covert recalcitrance in IS implementation. European Journal of Information Systems, 5, 208-219.

Marcus, A. (2005). User interface design's return on investment: Examples and statistics. In R. G. Bias & D. J. Mayhew (Eds.), Cost justifying usability: An update for the Internet age (pp. 17–36). Amsterdam, the Netherlands: Elsevier.

McLean, G., Osei-Frimpong, K., Al-Nabhani, K., & Marriott, H. (2020). Examining consumer attitudes towards retailers' m-commerce mobile applications–An initial adoption vs. continuous use perspective. Journal of Business Research, 106, 139-157.

McLean, G. (2018). Examining the determinants and outcomes of mobile app engagement-A longitudinal perspective. Computers in Human Behavior, 84, 392-403.

Mehrabian, A., & Russell, J. A. (1974). An approach to environmental psychology. Cambridge, MA: The MIT Press.

Menidjel, C., Benhabib, A., & Bilgihan, A. (2017). Examining the moderating role of personality traits in the relationship between brand trust and brand loyalty. Journal of Product & Brand Management. Replace namesGounaris and Stathakopoulos, 2004; Ramirez and Goldsmith, 2009

Midgley, D. F. and G. R. Dowling, "Innovativeness: The Concept and Its Measurement J. Consumer Res., 4, (1978), 229–242.

Mohammadi, H. (2014). The moderating role of individual and social factors in Internet banking loyalty: an exploratory study. Transforming Government: People, Process and Policy, 8(3), 420-446.

Mokarian, M. A. 2007. Visual balance in engineering design for aesthetic value. Working paper, University of Saskatchewan.

Moon, H., Miller, D. R., & Kim, S. H. (2013). Product Design Innovation and Customer Value: Cross-Cultural Research in the United States and Korea. Journal of Product Innovation Management, 30(1), 31-43

Mowen, J. C., & Spears, N. (1999). Understanding compulsive buying among college students: A hierarchical approach. Journal of Consumer Psychology, 8(4), 407-430

Muller, C., & de Klerk, N. (2020). Influence of design aesthetics and brand name on generation Y students' intention to use wearable activity-tracking devices. International Journal of eBusiness and eGovernment Studies, 12(2), 107-121.

Nowak, S. (2023). The social lives of network effects: Speculation and risk in Jakarta's platform economy. Environment and Planning A: Economy and Space, 55(2), 471–489.

Nunnally, J. C., & Bernstein, I. H. (1994). Psychometric theory(3rd ed.). New York: McGraw-Hill. Patterson, M. G., West, M. A., & Wall, T. D. (2004). Integrated manufacturing, empowerment, and company performance. Journal of Organizational Behavior,25, 458-474

O'Brien, H. (2016). Theoretical Perspectives on User Engagement. In: O'Brien, H., Cairns, P. (eds) Why Engagement Matters. Springer, Cham.

O'Brien, H. L., & Toms, E. G. (2005). Engagement as process in human-computer interactions. Proceedings of the American Society for Information Science and Technology, 42(1).

O'Brien, H. L., & Toms, E. G. (2008). What is user engagement? A conceptual framework for defining user engagement with technology. Journal of the American society for Information Science and Technology, 59(6), 938-955.

O'Connor, Z. (2015), Color, contrast and gestalt theories of perception: The impact in contemporary visual communications design. Color Res. Appl., 40: 85-92.

Okazaki, S. (2009). Social influence model and electronic word of mouth: PC versus mobile internet. International Journal of Advertising, 28(3), 439-472

Oh, C., Roumani, Y., Nwankpa, J. K., & Hu, H. F. (2017). Beyond likes and tweets: Consumer engagement behavior and movie box office in social media. Information & Management, 54(1), 25-37.

Oliver, R. L. (1999). Whence consumer loyalty? Journal of marketing, 63(4_suppl1), 33-44.

Overbeeke, K., Djajadiningrat, T., Hummels, C., Wensveen, S., & Prens, J. (2003). Let's make things engaging. In Funology: From usability to enjoyment (pp. 7-17). Dordrecht: Springer Netherlands

Pappas, P. E. Kourouthanassis, M. N. Giannakos, and V. Chrissikopoulos, Shiny happy people buying: the role of emotions on personalized e-shopping, Electronic Markets, vol. 24 no.3, pp.193-206, 2014.

Parboteeah, D. V. Valacich, J. S., & Wells, J. D. (2009). The influence of website characteristics on a consumer's urge to buy impulsively. Information systems research, 20(1), 60-78.

Parker, Geoffrey & Van Alstyne, Marshall. (2005). Two-Sided Network Effects: A Theory of Information Product Design. Management Science. 51. 1494-1504.

Paunonen, Sampo V., 1998. Hierarchical organization of personality and prediction of behavior. J. Personal. Social. Psychol. 74 (2), 538-556
https://www.prnewswire.com/news-releases/86-percent-of-users-stop-using-food-delivery-apps-within-the-first-two-weeks-shows-clevertaps-latest-industry-benchmark-report-300866174.html

Peters, T., Işık, Ö., Tona, O., & Popovič, A. (2016). How system quality influences mobile BI use: The mediating role of engagement. International Journal of Information Management, 36(5), 773-783.

Previte, J., Russell-Bennett, R., Mulcahy, R., & Hartel, C. (2019). The role of emotional value for reading and giving eWOM in altruistic services. Journal of Business Research, 99, 157-166.

Puccinelli, N. M., Goodstein, R. C., Grewal, D., Price, R., Raghubir, P., & Stewart, D. (2009). Customer experience management in retailing: understanding the buying process. Journal of retailing, 85(1), 15-30.

Ravasi, D., & Lojacono, G. (2005). Managing design and designers for strategic renewal. Long range planning, 38(1), 51-77.

Ray, A., Dhir, A., Bala, P. K., & Kaur, P. (2019). Why do people use food delivery apps (FDA)? A uses and gratification theory perspective. Journal of retailing and consumer services, 51, 221-230.

Reichheld, F. F., & Schefter, P. (2000). E-loyalty: your secret weapon on the web. Harvard business review, 78(4), 105-113.

Romero, P., & Calvillo-Gámez, E. (2014). An embodied view of flow. Interacting with Computers, 26(6), 513-527.

Rönkkö, M., & Cho, E. (2022). An updated guideline for assessing discriminant validity. Organizational Research Methods, 25(1), 6-14.

Rosseel Y (2012). "Lavaan: An R Package for Structural Equation Modeling." Journal of Statistical Software, 48(2), 1–36. The jamovi project (2023). jamovi (Version 2.3) [Computer Software]. Retrieved from https://www.jamovi.org.

Roy, R., & Riedel, J. C. (1997). Design and innovation in successful product competition. Technovation, 17(10), 537-594.

Roy, S. K., & Butaney, G. T. (2014). Customer's relative loyalty: an empirical examination. Journal of Strategic Marketing, 22(3), 206-221

Rozendaal, M. M., Keyson, D. V., & De Ridder, H. (2007, August). Product behavior and appearance effects on experienced engagement during experiential and goal-directed tasks. In Proceedings of the 2007 conference on Designing pleasurable products and interfaces (pp. 181-193).

Sáenz-de-Urturi, Z., García Zapirain, B., & Méndez Zorrilla, A. (2015). Elderly user experience to improve a Kinect-based game playability. Behaviour & Information Technology, 34(11), 1040-1051.

Sanchez-Franco, M. J., & Roldán, J. L. (2010). Expressive aesthetics to ease perceived community support: Exploring personal innovativeness and routinised behaviour as moderators in Tuenti. Computers in Human Behavior, 26(6), 1445-1457

Seeun Kim, Tae Hyun Baek,
Examining the antecedents and consequences of mobile app engagement,
Telematics and Informatics, Volume 35, Issue 1, 2018, Pages 148-158.

Seva, R. R., and M. G. Helander. 2009. The influence of cellular phone attributes on users' affective experiences: A cultural comparison. International Journal of Industrial Ergonomics 39: 341–46.

Sharma, V., & Tiwari, A. K. (2021). A Study on User Interface and User Experience Designs and its Tools. World Journal of Research and Review (WJRR), 12(6).

Sheth, J.N., B.E. Newman, and B.L. Gross, "Why we buy what we buy: a Theory of Consumption Values", Journal of Business Research, Vol. 22, No. 2: 159-170, 1991.

Sherman, E., Mathur, A., & Smith, R. B. (1997). Store environment and consumer purchase behavior: Mediating role of consumer emotions. Psychology and Marketing, 14(4), 361–378.

Söderlund, M. (2006). Measuring customer loyalty with multi-item scales: A case for caution. International journal of service industry management. 17(1), 76-98.

Soni, M., Jain, K., & Jajodia, I. (2021). Mobile health (mHealth) application loyalty in young consumers. Young Consumers, 22(3), 429-455.

Soyeun (Olivia) Lee, Heesup Han, Food delivery application quality in customer brand loyalty formation: Identifying its antecedent and outcomes, International Journal of Hospitality Management, Volume 107, 2022, 103292, ISSN 0278-4319.

Srini S. Srinivasan, Rolph Anderson, Kishore Ponnavolu,
Customer loyalty in e-commerce: an exploration of its antecedents and consequences, 2002, Pages 41-50, ISSN 0022-43591273-92

Stavins, J. (2016). The effect of demographics on payment behavior: panel data with sample selection.

Sun, Y., Ding, W., Weng, C., Cheah, I., & Cai, H. H. (2022). The effect of consumer resistance to innovation-on-innovation adoption: the moderating role of customer loyalty. Asia Pacific Journal of Marketing and Logistics, 34(9), 1849-1863.

Sutcliffe, A. (2016). Designing for user experience and engagement. Why Engagement Matters: Cross-Disciplinary Perspectives of User Engagement in Digital Media, 105-126

Racherla, P., Furner, C. and Babb, J. (2012), "Conceptualizing the implications of mobile app usage and stickiness: a research agenda."

Ray, A., Dhir, A., Bala, P. K., & Kaur, P. (2019). Why do people use food delivery apps (FDA)? A uses and gratification theory perspective. Journal of Retailing and Consumer Services.

Ramasundaram, A., Pandey, N., Shukla, Y., Alavi, S., & Wirtz, J. (2023). Fluidity and the customer experience in digital platform ecosystems. International Journal of Information Management, 69, 102599.

Ramendra Thakur, Arifin Angriawan, John H. Summey,
Technological opinion leadership: The role of personal innovativeness, gadget love, and technological innovativeness, Journal of Business Research, Volume 69, Issue 8 2016, Pages 2764-2773.

Reisdorf, B. C., & Groselj, D. (2017). Internet (non-) use types and motivational access: Implications for digital inequalities research. New Media & Society, 19(8), 1157-1176.

Ribbink, D., Van Riel, A. C., Liljander, V., & Streukens, S. (2004). Comfort your online customer: quality, trust and loyalty on the internet. Managing Service Quality: An International Journal, 14(6), 446-456.

Rieber, L. P. (1996). Seriously considering play: Designing interactive learning environments based on the blending of microworlds, simulations, and games. Educational technology research and development, 44(2), 43-58.

Robert, D., & John, R. (1982). Store atmosphere: An environmental psychology approach. Journal of Retailing, 58(1), 34–57.

Rogers, E. M. and F. F. Shoemaker Communication of Innovations, The Free Press, New York, 1971.
——, Diffusion of Innovations, Third Ed., The Free Press, New York, 1983.
——, Diffusion of Innovations, Fourth Ed., The Free Press, New York,

Rogers, E. M. (1995). Diffusion of Innovations: modifications of a model for telecommunications. Die diffusion von innovationen in der telekommunikation, 25-38.

Sanchez-Franco, M. J., & Roldán, J. L. (2010). Expressive aesthetics to ease perceived community support: Exploring personal innovativeness and routinised behaviour as moderators in Tuenti. Computers in Human Behavior, 26(6), 1445-1457.

Santosa, P. I., Wei, K. K., & Chan, H. C. (2005). User involvement and user satisfaction with information-seeking activity. European Journal of Information Systems, 14, 361-370.

Stavins, J. (2016), "The effect of demographics on payment behavior: panel data with sample selection", 7 June, available at: https://papers.ssrn.com/abstract=2801488 (accessed 21 August 2021).

Su, D. N., Nguyen-Phuoc, D. Q., Duong, T. H., Dinh, M. T. T., Luu, T. T., & Johnson, L. (2022). How does quality of mobile food delivery services influence customer loyalty? Gronroos's service quality perspective. International Journal of Contemporary Hospitality Management, (ahead-of-print)

Sun, Y., Ding, W., Weng, C., Cheah, I., & Cai, H. H. (2022). The effect of consumer resistance to innovation-on-innovation adoption: the moderating role of customer loyalty. Asia Pacific Journal of Marketing and Logistics, 34(9), 1849-1863

Sushant Kumar, Aarushi Jain, Jung-Kuei Hsieh,

Impact of apps aesthetics on revisit intentions of food delivery apps: The mediating role of pleasure and arousal, Journal of Retailing and Consumer Services, Volume 63, 2021

Swaak, M., De Jong, M., & De Vries, P. (2009, July). Effects of information usefulness, visual attractiveness, and usability on web visitors' trust and behavioral intentions. In 2009 IEEE International Professional Communication Conference (pp. 1-5). IEEE.

Sweeney, J. C., & Soutar, G. N. (2001). Consumer perceived value: The development of a multiple item scale. Journal of retailing, 77(2), 203-220

Sweeney, J. C., G.N. Soutar, A. Whiteley, and L. W. Johnson, "Generating Consumption Value Items: A Parallel Interviewing Process Approach." Asia Pacific Advances in Consumer Research, Vol. 2, No. 1: 108-15, 1996.

Tae Hyun Baek & Chan Yun Yoo (2018) Branded App Usability: Conceptualization, Measurement, and Prediction of Consumer Loyalty, Journal of Advertising, 47:1, 70-82.

Taki, P., & Gupta, M. (2021). Examining travel mobile app attributes and its impact on consumer engagement: An application of SOR framework. Journal of Internet Commerce, 20(3), 293-318.

Tarute, A., Nikou, S. and Gatautis, R. (2017), "Mobile application driven consumer engagement", Telematics and Informatics, Vol. 34 No. 4, pp. 145-156,

Tellis, G.J., and G.J. Gaeth, "Best value, price-seeking, and price aversion: the impact of information and learning on consumer choices." Journal of Marketing, Vol. 54, No. 2: 34-45, 1990.

Thakur, R. (2016), "Understanding customer engagement and loyalty: a case of mobile devices for shopping", Journal of Retailing and Consumer Services, Vol. 32, pp. 151-163.

Tian, Z. (2023). Influence of gamification on user loyalty toward mobile applications. Social Behavior and Personality: an international journal, 51(5), 1-10.

Tran Xuan, Q., Truong, H. T., & Vo Quang, T. (2023). Omnichannel retailing with brand engagement, trust and loyalty in banking: the moderating role of personal innovativeness. International Journal of Bank Marketing.

Turel, O., Serenko, A., & Giles, P. (2011). Integrating technology addiction and use: An empirical investigation of online auction users. MIS quarterly, 1043-1061

Vaghefi, I., & Qahri-Saremi, H. (2017). From IT addiction to discontinued use: A cognitive dissonance perspective.

Vayghan, S., Baloglu, D., & Baloglu, S. (2022). The impact of utilitarian, social and hedonic values on hotel booking mobile app engagement and loyalty: a comparison of generational cohorts. Journal of Hospitality and Tourism Insights.

Van der Heijden, H., Verhagen, T., & Creemers, M. (2003). Understanding online purchase intentions: contributions from technology and trust perspectives. European journal of information systems, 12(1), 41-48.

Van Doorn, J., Lemon, K. N., Mittal, V., Nass, S., Pick, D., Pirner, P., & Verhoef, P. C. (2010). Customer engagement behavior: Theoretical foundations and research directions. Journal of service research, 13(3), 253-266.

Verhagen, T., Swen, E., Feldberg, F., & Merikivi, J. (2015). Benefitting from virtual customer environments: An empirical study of customer engagement. Computers in Human Behavior, 48, 340-357

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS quarterly, 425-478.

Vivek, S.D., Beatty, S.E. and Morgan, R.M. (2012), "Customer engagement: exploring customer relationships beyond purchase", Journal of Marketing Theory and Practice, Vol. 20 No. 2, pp. 122-146.

Walsh, V. (1996). Design, innovation and the boundaries of the firm. Research policy, 25(4), 509-529.

Wang, W., & Butler, J. E. (2006). System deep usage in post-acceptance stage: A literature review and a new research framework. International Journal of Business Information Systems, 1(4), 439-462.

Wang, Y. S. (2008). Assessing e-commerce systems success: a respecification and validation of the DeLone and McLean model of IS success. Information systems journal, 18(5), 529-557

Wang, X., & Zhang, Q. (2018). Does online service failure matter to offline customer loyalty in the integrated multi-channel context? The moderating effect of brand strength. Journal of Service Theory and Practice, 28(6), 774-806.

Webster, J. and J. J. Martochhio, "Microcomputer Playfulness: Development of a Measure with Workplace Implications," MIS Quarterly, 16, 2 (1992), 201–226.

Webster, J., & Ho, H. (1997). Audience engagement in multimedia presentations. ACM SIGMIS Database: the DATABASE for Advances in Information Systems, 28(2), 63-77.

Weichbroth, P. (2020). Usability of mobile applications: a systematic literature study. Ieee Access, 8, 55563-55577.

Wolter, J. S., Bock, D., Smith, J. S., & Cronin Jr, J. J. (2017). Creating ultimate customer loyalty through loyalty conviction and customer-company identification. Journal of Retailing, 93(4), 458-476.

Woszczynski, A. B., Roth, P. L., & Segars, A. H. (2002). Exploring the theoretical foundations of playfulness in computer interactions. Computers in Human Behavior, 18(4), 369-388.

Wu, L. W. (2011). Satisfaction, inertia, and customer loyalty in the varying levels of the zone of tolerance and alternative attractiveness. Journal of Services Marketing, 25(5), 310-322.

Xiang, G., Chen, Q., & Li, Q. (2022). How attachment affects users continued use intention of tourism mobile platform: A user experience perspective. Frontiers in Psychology, 13, 995384.

Yee, B. Y., & Faziharudean, T. M. (2010). Factors affecting customer loyalty of using Internet banking in Malaysia. Journal of Electronic Banking Systems, 21, 2010.

Yu-Hui Fang, An app a day keeps a customer connected: Explicating loyalty to brands and branded applications through the lens of affordance and service-dominant logic, Information & Management, 2019, Pages 377-391, ISSN 0378-7206, Volume 56, Issue 3,

Zahidi, Z., Lim, Y. P., & Woods, P. C. (2014, August). Understanding the user experience (UX) factors that influence user satisfaction in digital culture heritage online collections for non-expert users. In 2014 Science and Information Conference (pp. 57-63). IEEE.

Zainuddin, N., Previte, J., & Russell-Bennett, R. (2011). A social marketing approach to value creation in a well-women's health service. Journal of Marketing Management, 27(3-4), 361-385

Zarantonello, L., Schmitt, B. Using the brand experience scale to profile consumers and predict consumer behavior. J Brand Management 17, 532–540 (2010).

Zeithaml, V. A., Berry, L. L., & Parasuraman, A. (1996). The behavioral consequences of service quality. Journal of marketing, 60(2), 31-46.

VITA

AUDREY E. BURKE

Born: London, England

1984-1988	B.S., Management School of Management Binghamton University Binghamton, NY
1993-1995	MBA., Marketing Clark Atlanta University Atlanta, GA
2019-2019	Human Centered Design Specialization University of Virginia Charlottesville, VA
2021 -2024	Doctoral Candidate Florida International University Miami, Florida