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**Transforming Retail: The Impact of
Technological Innovations and the Metaverse
on Shopping Experiences**

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INTRODUCTION TO DISSERTATION

Over the past decades, retail has undergone significant transformation due to the rise of digitalization and technological innovation. Consumers are no longer limited to traditional in-store experiences and e-commerce, with phygital shopping, and even the metaverse reshaping how people shop. The integration of emerging technologies like augmented reality, virtual reality, and AI-powered assistants has changed not only the way consumers engage with retailers but also how they make purchasing decisions. At the same time, in this new technological era, shoppers purchase items not only for physical use in real life but also for virtual-only use in virtual worlds such as the metaverse worlds. As a result, as the retail landscape continues to evolve, understanding how these technologies impact shopper behavior has become a critical area of inquiry for both researchers and industry players.

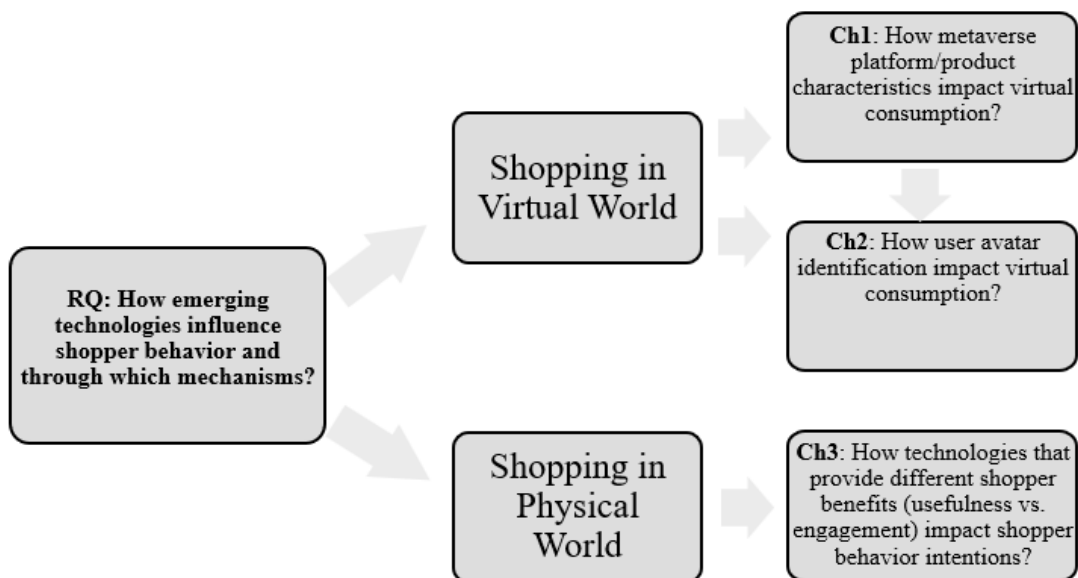
The adoption of technologies with relevant characteristics in both physical and virtual spaces presents opportunities for retailers to enhance the shopping experience, improve customer satisfaction, and boost sales. However, to effectively implement these technologies, retailers must understand how they influence consumer perceptions, behaviors, and decision-making processes. That is why research into understanding shoppers' perceptions and acceptance of new technological innovations, as well as understanding the mechanisms through which these technologies impact the shoppers' behavior, is essential for navigating the future of retail. Therefore, this research is not only relevant for academic exploration but also holds direct implications for shaping the strategies of forward-thinking retailers.

The primary aim and objective of this dissertation is to investigate how emerging technologies in both physical and virtual retail spaces influence shopper behavior and through which mechanisms they do so. Through a combination of academic

theories, frameworks, as well as both qualitative and quantitative methods of research, this dissertation seeks to provide insights into the mechanisms through which technological innovations impact shopper experiences and behavior in the evolving retail landscape.

To contribute to the overall aim, this dissertation has research questions in three key areas covered in three chapters: how metaverse platform/product characteristics impact virtual consumption, how user avatar identification impacts virtual consumption, and how technologies that provide different shopper benefits impact shopper behavior intentions in the physical world. The interlinks and connections of the three chapters to the main research question can be found in Figure 1.

Figure 1: Interlinks between Dissertation Chapters



In Chapters 1 and 2, by looking at virtual consumption through the prism of self-extension and symbolic consumption theories, I study the factors that drive virtual consumption in the metaverse. Chapter 1 consists of a bibliographical overview of the current academic research on virtual consumption, introduces the self-extension and symbolic consumption theories, and tests the metaverse platform and virtual product characteristics impacting virtual consumption. Chapter 2 extends the insights from Chapter 1 and examines the role of avatar identification on virtual consumption. Chapter 3 shifts research into the physical retail environment, categorizing retail technologies based on the usefulness and engagement benefits they provide, and exploring how interlinks of these benefits impact shopper behavior intentions and perceived shopping value. Together, these chapters contribute to the dissertation’s overall objective of studying how technological innovations influence shopper behavior across diverse retail contexts. Summary description of the dissertation chapters can be found in Table 1.

Table 1: Summary of Dissertation Chapters

Chapters	Chapters’ Research Questions	Method	Outcomes
1	How do metaverse platform/product characteristics impact virtual consumption?	Study1: Online Survey	-Bibliographical review of key factors impacting virtual consumption -Platform characteristics of sociability, ease of use, and ease of making a purchase are positively related to the purchasing intentions of virtual items directly or indirectly -Product characteristics of emotional and social value of virtual products are positively related to the purchasing intentions of virtual items

			- Intention to use the metaverse is positively related to the purchasing intentions to purchase virtual items
2	How does user avatar identification impact virtual consumption?	2 Studies: Study1: Interviews Study2: Online Survey	-There are 3 self-representation strategies: real/better-self, other self, and fantasy self. User with real/better-self strategy have a stronger connection with their avatars -The main goals for virtual consumption are a search for self-expression and enjoyment obtained from virtual goods -Avatar identification is positively related to the intention to purchase virtual goods via serial mediation through self-expression and perceived enjoyment
3	How do technologies that provide different shopper benefits (usefulness vs. engagement) impact shopper behavior intentions in the physical world?	4 Studies: Pre-Study: Online Survey Studies 1-3: Online Surveys	- A novel 2x2 framework that categorizes retail technologies based on their usefulness and engagement benefits - Technologies that provide engagement alone are insufficient to impact positive shoppers' behavior - Technologies that provide usefulness positively impact shoppers' behavior - Technologies that provide a combination of usefulness and engagement make the most significant positive impact on shoppers' behavior -Impact of benefits provided by the use of technology impact the shoppers' behaviors via mediating route of shopper perceived value of the shopping experience

CHAPTER 1

How to Help Users Dress to Impress in the Metaverse

ABSTRACT

In the context of the metaverse's rising prominence, this study investigates the features of metaverse/social virtual worlds that influence the core activity in those worlds - virtual consumption. In our explorative study, while looking at virtual consumption through the prism of self-extension and symbolic consumption theories and taking into consideration the social nature of metaverse/social virtual worlds, we evaluated the platform and virtual product characteristics and their impact on virtual consumption. We suggested that to enhance virtual consumption, metaverse/social virtual world platforms need to be designed in a way to provide a comfortable environment for user interactions, self-extension, and symbolic consumption: platform characteristics need to improve the number and quality of social interactions, while products need to be designed for efficient self-extension and communication of the symbolic values of the products. As expected, the findings of our study, which included a survey of the metaverse/social virtual worlds' users, revealed that sociability of the platform (opportunities to interact in the metaverse/social virtual world), the ease of making a purchase and the ease of platform use (means of comfortable environment for interactions and consumption), as well as the social and emotional values of the virtual products (means of self-extension and symbolic consumption), make a statistically significant impact on the intention to purchase virtual goods directly or indirectly. We believe that our study enriches academic literature and offers actionable insights for industry stakeholders by shedding light on the key platform characteristics and virtual products' features that encourage positive user behavior in metaverse/social virtual worlds.

Keywords: the metaverse, social virtual worlds, virtual consumption, virtual product characteristics, platform characteristics

CORE CONTENT

1. Introduction

Over the last few decades, tremendous technological changes have reshaped consumer lives and behavior into new forms and formats. If a couple of decades ago, people were shifting their major activities into online worlds, nowadays, an increasing number of people are becoming active in social virtual worlds, or metaverses. Since 2021, many companies have moved into the metaverses (Kaplan & Haenlein, 2009) to create additional touchpoints with customers, conduct marketing activities, and sell virtual items. Tech giants such as Meta, Microsoft, Apple, Tencent, Alibaba, Sony, and Nintendo, along with gaming worlds like Fortnite, Sandbox, and Roblox, are all developing metaverses (Belk et al., 2022), Meta's Horizon Workroom introduced the concept of virtual offices, pop stars host virtual concerts, and fashion brands sell NFTs in these metaverses. On one hand, metaverse platforms can provide virtual spaces to support physical reality. For example, users can obtain knowledge and learn skills to be used in the physical world (training programs, education), experience virtual prototypes of physical products (clothes, cars, apartments), or communicate with avatars in virtual worlds to access physical world services. On the other hand, metaverse platforms provide users with a parallel virtual world consisting of activities, products, and services that exist only virtually.

In these virtual worlds, one of the most important virtual activities for users is the consumption of virtual goods (Jung & Pawlowski, 2014), such as clothing and accessories for avatars, real estate, and virtual services. This raises the intriguing question: Why do people purchase virtual items that do not have any functional value in the physical world, and what attributes of the platform, product, or user drive this

behavior? Prior research on the topic of virtual consumption primarily focused on studying gaming virtual worlds or early social virtual worlds. It identified environmental and platform characteristics (Animesh et al., 2011; Cheon, 2013; Lee & Kim, 2022; Mäntymäki & Salo, 2013), user motivational characteristics (Guo & Barnes, 2011; Mäntymäki & Salo, 2013;), and user experience characteristics (Animesh et al., 2011; Cheon, 2013; Huang, 2012; Mäntymäki & Salo, 2013; Zhang et al., 2017) that impact the intention to purchase virtual items. However, even though the mentioned research has established the foundation for understanding user behavior in virtual worlds, it remains very fragmented, requires a comprehensive framework, and needs to be updated due to improved technological capabilities of the metaverse/social virtual worlds and shifts in user behavior after COVID-19.

The purpose of this research is to create a comprehensive framework and evaluate factors that impact virtual consumption, which we restrict to the consumption of only virtual clothing/accessories for avatars. In our research, we take into consideration the main characteristic of metaverse/social virtual worlds - the social context of the platforms and look at virtual consumption through the prism of self-extension and symbolic consumption theories, according to which virtual products are used as tools for self-extension and communication of self-image through avatars (Animesh et al., 2011; Lehdonvirta et al., 2009; Martin, 2008). Through a survey of current metaverse/social virtual worlds' users, our research question aimed to investigate the observable environmental factors, such as product and platform characteristics of metaverse/social virtual worlds, that impact the intention to purchase virtual goods. According to the research findings, the sociability of the platform, the ease of making a purchase, the ease of platform use, as well as the social and emotional

values of the virtual products all have a statistically significant impact on the intention to purchase virtual goods, either directly or indirectly, via altering the intention to use the platform in the future.

This research makes several noteworthy contributions. First, it provides an extensive bibliographic review of academic literature on virtual consumption, merges the findings from previous research into one comprehensive framework, and tests this framework in contemporary metaverse/social virtual worlds. Second, it brings an additional angle to the current research and expands academic literature on virtual consumption by examining the characteristics of the virtual worlds through the prism of self-extension and symbolic consumption theories, while considering the main but undervalued in previous academic literature feature of the metaverse/social virtual worlds - the social context. Finally, our research contributes to industry professionals. Given the hype surrounding the metaverse, many companies are building or entering metaverse worlds and selling virtual products without a clear understanding of what product and platform characteristics impact purchasing behavior. The insights provided in this research offer guidance to industry professionals on designing metaverse platforms more effectively. By enhancing platform and product attributes that are appreciated by users, these insights can help improve user behavior and increase revenues from virtual product purchases.

The rest of the article is structured as follows. The second and third sections present a literature review, the research model, and hypotheses development. The fourth section describes the empirical research, while the final section concludes with a discussion of the results, contributions, and limitations.

2. Theoretical Background

2.1. Virtual Worlds and the Metaverse

The term “metaverse” became a buzzword in recent years; however, virtual worlds themselves are not new. The roots of virtual worlds can be traced back to the 1970s and 1980s when the first text-based multiplayer dungeon (MUD) games were created. These were followed by an appearance in the 1980s-1990s of a wide range of virtual games, including shooting games, fantasy role-playing games, massively multiplayer online role-playing games (MMORPGs), and social virtual worlds.

Overall, virtual worlds can be categorized into gaming virtual worlds and social virtual worlds (Jung, 2011). While both types share many characteristics and provide virtual environments for users’ entertainment, some features differentiate these two worlds. In gaming worlds, user behavior depends on pre-defined narratives, scripts, plots, and themes created by game designers. In contrast, the focus of social virtual worlds, which were defined by Mäntymäki and Salo (2013) as “persistent computer-mediated 3D environments, where users are represented as avatars”, is interaction with other users and exploration of the virtual environment via customizable avatars. Additionally, consumption in social virtual worlds differs from consumption in gaming virtual worlds. Unlike consumption in gaming virtual worlds, where the key goal of virtual consumption is to increase the performance of the character, the main goal of virtual consumption in social virtual worlds is the decorating activity of avatars or environment and emphasis on reaching social and emotional rather than functional goals of consumption. However, nowadays, there are no clear boundaries between gaming and social virtual worlds, as gaming worlds incorporate socialization features, while social worlds integrate elements of gaming.

The concept of the metaverse is derived from the novel “Snow Crash” published by Neal Stephenson in 1992 and represents a three-dimensional virtual world in which ‘Meta’ means virtual and abstract, and ‘verse’ means universe. The metaverse is the permanent, immersive mixed-reality world where people can synchronously interact with other people and objects and live beyond the limitations of time and space, using avatars and immersion-supporting devices, platforms, and infrastructures (Kaplan & Haenlein, 2009). Also, in 2022, Mark Zuckerberg defined the Metaverse as “a network of 3D virtual worlds focused on social connection” (Abbate et al., 2022). In other words, the concept of the metaverse is close to the definition of the social virtual world, and in our research, we use the terms “social virtual world” and “metaverse” interchangeably.

2.2. Purchasing Behavior in Virtual Worlds

Previous academic literature on the topic of virtual consumption identified several factors that influence purchasing behavior in virtual worlds. The majority of articles discuss environmental characteristics that impact the usage of the virtual worlds, motivations that influence users to perform purchasing of virtual items, and users’ virtual experiences on platforms that lead to purchasing behavior.

Regarding environmental characteristics, the majority of articles discuss virtual platform characteristics that affect user adoption of virtual worlds and impact purchasing behavior. Among platform characteristics, the most discussed features are perceived network size (Lee & Kim, 2022; Mäntymäki & Salo, 2011; Mäntymäki & Salo, 2013; Mäntymäki et al., 2014), platform’s technological and spatial features (Animesh et al., 2011), as well as characteristics such as interactivity, vividness, and involvement (Cheon, 2013).

Motivational factors cover utilitarian, hedonic, and social factors that influence virtual world adoption and purchasing behavior (Mäntymäki & Salo, 2013). Guo and Barnes (2012) divided motivators into extrinsic (effort expectancy, performance expectancy, and perceived value) and intrinsic (perceived enjoyment and the customization of the character) factors that predict purchase intention in virtual worlds. Similarly, Mäntymäki and Salo (2013), showed that users' perceptions of usefulness, enjoyment, and network size influenced virtual consumption.

In addition to motivational and virtual environment factors, user experiences in the virtual world act as mediators and affect the consumption of virtual products. The process of flow is one of the key experiences discussed in the literature that impacts purchasing behavior. In addition to the process of flow, researchers examined social presence and telepresence (Animesh et al., 2011; Mäntymäki & Salo, 2013), affective involvement and cognitive involvement (Huang, 2012), and satisfaction (Cheon, 2013). Zhang et al. (2017) also added social connections and interactions as factors that positively influence consumer goals and spending. The key research articles contributing to the topic of virtual consumption are listed in Appendix 1.

2.3. The Research Model

Metaverse/social virtual worlds have several distinct characteristics that differentiate these worlds from other platforms and make an impact on the nature of purchasing behavior. First of all, metaverse/social virtual worlds are inherently social platforms, therefore the ultimate goal of those platforms is facilitating social interaction. We suggest that the value of using these platforms depends on the social context of the platform and the number and quality of social interactions. Second, users interact with each other on these platforms via avatars. Because the real identities of users in metaverse/social virtual worlds are anonymous, participants create virtual identities

through avatars and perform consumption of virtual items to enhance these identities. Finally, since virtual consumption in metaverse/social virtual worlds is visible to other members of the virtual community, lacks physical functional value, and focuses on enhancing the avatar image, consumption in these worlds can be viewed as symbolic consumption.

In sum, considering that the primary activity in metaverse/social virtual worlds is social interaction and virtual items lack physical value and are being purchased mainly for decorating users' virtual identities in the forms of avatars, to understand virtual consumption in the metaverse/social virtual worlds we employ self-extension and symbolic consumption theories. Furthermore, we investigate the impact of the metaverse/social virtual worlds' platform and product characteristics on the intention to purchase virtual goods by selecting and examining the characteristics that provide users with a comfortable environment for interactions, self-extension, and symbolic consumption.

Self-extension in Metaverse/Social Virtual Worlds

Self-image can be referred to a person's evaluation of him/herself, his/her attitudes and perceptions (Grubb & Grathwohl, 1967; Wang & Chang, 2014) and can consist of an inner core self and aggregate selves, ranging from family to neighborhood to nation (Belk, 2013), depending on the groups the person associates him/herself with.

To operate in the metaverse/social virtual worlds and interact with objects and people, users need to create virtual selves in the form of avatars through which they can present themselves to others in the virtual world (Koles & Nagy, 2012).

Therefore, in the virtual worlds, the selves of the users are represented by avatars, with which users can identify strongly and which can affect the user's sense of self-image.

People express their self-image, or self/selves, in different ways, and one way how they do this is through the items they possess (Wang & Chang, 2014). Various possessions can enhance the self/selves of their individual and become a part of the extended self. In the virtual world, where users are represented by avatars, self-extension strategies consist of the idealization, development, and manipulation of avatars (Mäntymäki & Salo, 2013) with the help of virtual possessions. When users create avatars, these avatars can reflect the user's physical appearances, attitudes, or other elements of user identity (Van Ryn et al., 2018) and enhancing those avatars with virtual possessions helps users extend their selves into virtual worlds, strengthen their expression of selves, and communicate their selves to the virtual community. At the same time, by customizing avatars, users can experiment with self-presentation and create avatars very different from their real selves (Van Ryn et al., 2018). In this case, virtual possessions can help users diminish the tension caused by the gap between their offline selves and the selves they are trying to become in the virtual world (Mäntymäki & Salo, 2013). In sum, virtual possessions help users extend their selves and enhance the selves they want to be in virtual worlds.

Symbolic Consumption in Metaverse/Social Virtual Worlds

The process of constructing "the self" does not happen in a vacuum and evolves through time and social experience, while the process of expressing "the self" has the goal of obtaining a positive reaction from the reference group (Grubb & Grathwohl, 1967). In the process of expressing the self, Belk (1988) noted that possessions comprising the extended self could serve as cues for others to form impressions about us. Therefore, possessions can be used to enhance interactions in the community and serve as a means of communication between the person and

reference groups (Grubb & Grathwohl, 1967). As a result, people communicate their self/selves through the consumption of products that have publicly recognized symbolic meanings (Wang & Chang, 2014) to create desired reactions from others.

In the metaverse/social virtual worlds environment, we suggest looking at consumption through the lenses of symbolic consumption because both symbolic consumption and consumption in metaverse/social virtual worlds require a social context and community for the consumption of goods (Martin, 2008). Additionally, since virtual products do not satisfy any traditional functional needs, the value of products in metaverse/social virtual worlds can be defined only by the symbolic value shared between users of the virtual environment (Martin, 2008).

Thus, we propose that users purchase virtual goods for avatars to improve their social interactions by enhancing their self/selves in virtual worlds via self-extension and symbolic consumption strategies. At the same time, users want to enhance their self/selves through virtual consumption only when the value of using particular metaverse/social virtual world platforms is high enough and the platform provides an adequate level of social interactions.

Therefore, we propose that to boost virtual consumption, metaverse/social virtual worlds need to be designed with characteristics that provide a comfortable environment and improve social interactions. Additionally, the product characteristics that users purchase and display in the virtual worlds need to have symbolic meaning that makes an impression and enhances the image of the avatar.

3. Hypotheses Development

As mentioned earlier, in the metaverse/social virtual worlds, the possessions that users have can be strongly linked to the construction of virtual selves (Martin, 2008),

where virtual goods are new media elements utilized by members for representation, expression, and communication in online environments (Huang, 2012). In our study, we examine the features of these online environments, such as platform and virtual product characteristics, that help users achieve better self-extension, communication, and socialization eventually resulting in a higher intention to purchase virtual goods.

Intention to use the metaverse/social virtual world platforms

In metaverse/social virtual worlds, users are not obliged to purchase virtual goods and can interact with each other through anonymous avatars without enhancing the avatars' look through possessions. However, at a certain point, it becomes important for users to express their virtual selves. The salience of virtual selves and communicating these selves to others becomes relevant to users when metaverse/social virtual world platforms provide value and create an intention to use the platforms in the future. Only with the intention to use metaverse/social virtual world platforms in the future, it makes sense for users to make investments in avatar enhancements by purchasing virtual items. Mäntymäki and Salo (2011) found a strong relationship between continuous user engagement with the virtual world platform and purchasing behavior on that platform. At the same time, Badrinarayanan et al. (2015) added that game elements impact the user's identification with the platform and community which in its term impacts consumption behavior (purchase, community engagement, co-production, recruitment, WOM). Therefore, we propose that the intention to use the platform and the intention to purchase virtual goods are interconnected, and a stronger intention to use the platform in the future impacts the intention to purchase virtual goods. If the user thinks that the time spent on the platform will be short, he/she will have fewer

incentives to purchase virtual items (Hamari, 2015) and vice versa, if the user appreciates the experiences at the platform and intends to use the platform in the future, he/she will have a higher intention to purchase virtual items.

H1: Intention to use the metaverse/social virtual world platforms is positively related to the intentions to purchase virtual items in the future

Platform Characteristics

Platform characteristics, or environmental stimuli, have been widely discussed in academic literature to identify the impact of platform design on user experiences and behavior. In our study, we claim that platform characteristics need to impact the intention to purchase virtual goods directly or indirectly through altering the intention to use the platform. We suggest that the intention to use the platform depends on the value of the social interactions that users have on the platform, due to the social nature of the metaverse/social virtual worlds. At the same time, according to Arnett et al. (2003), identity salience is affected by the number and quality of social interactions related to identity. Therefore, we suggest that the platform characteristics that enhance the creation of quality and quantity of social contacts and provide a comfortable atmosphere for interactions not only motivate users to use the platform in the future but also create an encouraging environment to perform self-extension and symbolic consumption because communicating the virtual self/selves become important to users.

The broad categories of platform characteristics stimuli can be divided into technological and spatial features of the virtual world (Animesh et al., 2011). The difference between technological and spatial features is that if technological features are designed by the designers of the platform, the spatial features are created by using the avatars in the virtual world. Technological features of platform

characteristics in our framework include *ease of use, ease of making a purchase, sociability, and interactivity* of the platform. On the other hand, the spatial features include *close network size and density* on the platform.

Perceived ease of use. Originated as a part of the TAM framework (Davis, 1989), perceived ease of use has been widely discussed in previous literature suggesting that easy-to-use technology or design of the platform has a positive impact on user's attitudes toward the technology (Bigne, 2021) and purchase intentions. Additionally, the perceived platform's ease of use can be related to effort expectancy, or the degree to which purchasing virtual items would be free of physical or mental efforts (Guo & Barnes, 2012). In our study, we suggest that the ease of platform use provides users with a comfortable environment for interactions, which can enhance the quality and quantity of social interactions and increase the intention to use the platform in the future.

H2: Perceived ease of use of the metaverse/social virtual world platforms is positively related to the intention to use the platform in the future

Perceived ease of making a purchase. While technology and platform ease of use have been widely discussed variables in the literature, the variable that has been omitted from previous research is the ease of purchasing process. Currently, purchasing virtual items can be done using earned points, in-game currencies, or cryptocurrencies. The process of obtaining cryptocurrencies is not a straightforward task, as different metaverse/social virtual worlds use different cryptocurrencies, and the use of cryptocurrencies in some countries is prohibited. At the same time, converting regular currencies into in-game currencies might also require additional knowledge and effort. Thus, the purchasing process of virtual items that involve the use of in-game or cryptocurrencies, can require additional time and effort spent,

which can negatively impact purchasing intentions. In such a context, it is important to include the ease of making a purchase as an additional factor in creating a comfortable environment for purchasing intention.

H3: Perceived ease of making a purchase on the metaverse/social virtual world platforms is positively related to the purchasing intentions of virtual items in the future

Perceived sociability. One of the most crucial platform characteristics that can drive users' interactions is the sociability of the platform. Sociability provides the opportunity for users to socialize in virtual worlds. Sociability is a feature that focuses on participant-participant interactions (Animesh et al., 2011; Preece, 2001), brings people together in time and space (Animesh et al., 2011; Dimmick et al., 1994), and creates engagement and belonging among the participants. Sociability impacts users in two ways. First, more opportunities for users to interact with each other bring value to the platform and increase the intention to use the platform in the future. Second, high sociability can impact the intention to purchase virtual items because it provides rich social interactions that enhance the value of consuming virtual products for creating a social self-image (Animesh et al., 2011; Sweeney and Soutar 2001), makes communication of selves more successful, and makes purchasing of virtual items more meaningful.

H4a: Perceived sociability of the metaverse/social virtual world platforms is positively related to the intention to use the platform in the future

H4b: Perceived sociability of the metaverse/social virtual world platforms is positively related to the purchasing intentions of virtual items in the future

Perceived interactivity. Just like with platform sociability, through technical features, the designers can also enhance platform interactivity. In contrast to sociability, platform interactivity is the extent to which users can interact with the objects and modify the landscape, content (Animesh et al., 2011, Steuer 1992), or avatar features. Through interactivity, users can either create and modify objects to expose these objects to other members of the community or create objects together with others, leading to additional interactions and increasing the value of using the metaverse/social virtual world platform. Additionally, a high level of interactivity and control of the virtual environment creates additional tools and opportunities for users to make an avatar to become the user's version of the extended self (Animesh et al., 2011; Belk, 1988), which can improve the communication of the selves and motivate purchasing of the virtual goods.

H5a: Perceived interactivity of the metaverse/social virtual world platforms is positively related to the intention to use the platform in the future

H5b: Perceived interactivity of the metaverse/social virtual world platforms is positively related to the purchasing intentions of virtual items in the future

Perceived close network size. In contrast to technological characteristics, spatial characteristics of the platform are non-technological aspects that impact interactions between avatars (Animesh et al., 2011). Perceived network size is a widely discussed variable in platform acceptance, and is part of network externalities theory, which has been integrated into many frameworks. Following the network externalities theory, metaverse/social virtual worlds can be defined as a platform where the users' utility of a good increases with the number of other users on the platform (Katz & Shapiro, 1985; Mäntymäki & Salo, 2011). Therefore, perceived network size should make a positive impact on future platform use intention and

purchasing intention. However, one of the features of metaverse/social virtual world platforms is that they are not just regular platforms designed to connect two sides (such as buyers and sellers, etc.), they are meant to enhance social contacts.

Therefore, the quality of interactions between the users on the metaverse/social virtual world platform can depend on the presence of not just any users, but relevant people, such as user's friends, personal network, or people with whom the users associate themselves (Mäntymäki et al., 2014). Since the quality of interactions might depend on the presence of members from the close network, having a high number of close people can result in greater value from using the platform and a higher value in purchasing and exposing virtual items.

H6a: Perceived close network size of the metaverse/social virtual world platforms is positively related to the intention to use the platform in the future

H6b: Perceived close network size of the metaverse/social virtual world platforms is positively related to the purchasing intentions of virtual items in the future

Perceived density. While perceived closed network size can have a positive impact on the user's behavior intentions, the number of users can also have a negative impact on future platform use and purchasing intention. It is worth mentioning that users' spatial perception of metaverse/social virtual world 3D platforms differs from 2D platforms. Metaverse/social virtual world 3D platforms are closer to the physical world than 2D platforms in the sense that a high number of avatars can create a feeling of psychological stress and result in socially maladaptive behavior (Animesh et al., 2011; Calhoun, 1971), feeling of loneliness, and expression of defense against sensory overload, due to too many uncontrolled contacts with others (Animesh et al., 2011; Wilson & Baldassare, 1996). Therefore, when the number of avatars and

interactions becomes overwhelming, due to information overload it can negatively impact both intentions to use the platform and purchase virtual items.

H7a: Perceived density of the metaverse/social virtual world platforms is negatively related to the intention to use the platform in the future

H7b: Perceived density of the metaverse/social virtual world platforms is negatively related to the purchasing intentions of virtual items in the future

Therefore, regarding the platform characteristics, in our study we expect that perceived ease of use to make a positive impact on the intention to use the platform, while the ease of making a purchase to make a positive impact on the intention to purchase the virtual goods. At the same time, we expect perceived sociability, interactivity, and network size to make a positive impact, while density to make a negative impact on both the intention to use the platform and purchasing intention.

Product Characteristics

While there is a considerable amount of research focusing on external factors and platform characteristics that impact user behavior and intention to purchase virtual items, there is very limited research that focuses on the attributes of the purchased products themselves. Additionally, given the increasing number and variety of virtual items, it is important to understand which features of the product drive the purchasing intentions.

According to the existing theories from sociological and cultural studies about the consumption of traditional goods, three basic aspects of the product can be defined: functional aspects, emotional aspects, and the use of goods as markers for drawing social distinctions (Lehdonvirta, 2009). Despite the differences with physical goods in terms of product nature, the same aspects of the product can also be applied to the

consumption of virtual goods. In her qualitative study, Lehdonvirta (2009) identified that virtual products have similar attributes that act as purchasing drivers. These drivers consist of functional attributes (performance and functionality) and hedonic/social attributes (visual appearance and sounds, background fiction, provenance, customizability, cultural reference, branding, and rarity (Lehdonvirta, 2009). This research from sociological and cultural studies of consumption overlaps with consumer value theory, widely used in the marketing literature, which suggests that consumers make purchases to obtain the functional, emotional, and social values of a product (Kim et al., 2011).

In our study, we propose that users of metaverse/social virtual world platforms purchase virtual items to extend and communicate their self/selves and make an impression on other members of the community through symbolic meanings of virtual items. The selves can be represented not only by the markers of identity and groups users belong to, but also by the expression of tastes, interests, and choices. Therefore, we expect that product characteristics that bring social and emotional value will impact the purchasing intention of virtual items. However, we also want to test the well-established in academic literature concept of the functional value of the product, which can be divided into virtual functional quality and monetary value, and their impact on the intention to purchase virtual items.

Functional quality value. Functional value is a perceived utility on the item's capacity for functional, utilitarian, or physical performance (Kim et al., 2011). Functional value can be further split into functional quality and price utility, or monetary value (Kim et al., 2011). Even if the virtual goods in the metaverse/social virtual worlds do not have any functional value such as traditional functional utility in the physical world or improved character performance in gaming worlds, the concept

of functional value might differ but still exist and make an impact on virtual goods consumption in metaverse/social virtual worlds. One aspect of functional value - functional quality in metaverse/social virtual worlds can be expressed in the perceived overall excellence and expected performance of the virtual item, such as graphical features quality and compatibility with the environment and system (Kim et al., 2011) might be appreciated by users and motivate them to purchase virtual products.

H8: Product features providing functional quality are positively related to the purchasing intentions of virtual items in the future

Monetary value. The feature of virtual products that was overlooked in previous literature is the monetary value that virtual items can bring. Some metaverse/social virtual worlds platforms give users the opportunity to create and sell virtual goods, as well as cash out and exchange virtual money into offline currencies (Martin, 2008). Therefore, the majority of virtual items, after being bought, can be resold, or used as investment opportunities, which can bring additional monetary value to users.

H9: Product features providing monetary value are positively related to the purchasing intentions of virtual items in the future

Emotional value. Emotional value is the perceived utility of a virtual item's capacity to arouse feelings or affective states (Kim et al., 2011). In sociology literature, in traditional goods markets, apart from the functional characteristics of the product, the important value of the products lies in pleasure-seeking and the aesthetic and even artistic aspects of products (Lehdonvirta, 2009). Pleasure-seeking, or hedonic consumption, assumes that consumers use affects and feelings as a source of information to evaluate products and experiences (Ben-Ur et al., 2015; Pham 1998). In the virtual world, the aesthetic attributes of the virtual product such as on-screen

representation, animations, sounds associated, or narrative presented can impact the user experiencing hedonic pleasure during the consumption of the products (Lehdonvirta, 2009). Playfulness is another source of hedonic pleasure, constructed from the perceived feeling of interest, fun, and curiosity generated from the consumption of the virtual product (Kim et al., 2011) and can impact attitudinal outcomes such as positive affect, pleasure, and satisfaction (Kim et al., 2011). Therefore, emotional value can be obtained from the item's aesthetics, playfulness, or ability to increase self-esteem, which can positively impact the purchasing intention.

In virtual worlds, due to the fact that consumption of the products is visible to other members of the community, apart from personal enjoyment perceived from consumption of the product, enjoyment also can be obtained from the impression that the product makes on other members of the community. Therefore, users obtain enjoyment not only from the consumption of beautiful and fun products but also from expressing their tastes and choices and anticipated impressions that their avatars can make by wearing these fun and beautiful products.

H10: Product features providing emotional value are positively related to the purchasing intentions of virtual items in the future

Social value. Social value is the perceived utility of a virtual item's capacity to enhance one's social being (Kim et al., 2011). In symbolic consumption literature, consumer products are also communicators of symbolic meanings of status, class, group membership, difference, self-identity, and satisfaction in consuming these goods lies not in physical consumption, but in the effective transition of symbolic messages (Mäntymäki & Salo, 2013). Therefore, virtual items can enhance the user's self-image among virtual world members (Kim et al., 2011), and the majority

of virtual goods primarily satisfy individual social needs, such as prestige, status, uniqueness, and conformity (Animesh et al., 2011), and act as a means for self-expression through the avatar (Animesh et al., 2011). Therefore, people consume virtual products to enhance their social image because the purchase and display of virtual products can communicate social meanings to others (Kim et al., 2011). Apart from self-expression and communication of status and belongingness in the virtual world, virtual goods can also bring users together through common interests and profiles and act as a “social lubricant” (Martin, 2008). Thus, virtual items providing social value can result in further interactions and communication and help users create, maintain, and enhance personal relationships (Kim et al., 2011).

H11: Product features providing social value are positively related to the purchasing intentions of virtual items in the future

Therefore, regarding the virtual product characteristics, in our study, we test the hypotheses that higher levels of functional quality, monetary, emotional, and social value make a positive impact on the purchasing intention of virtual goods.

User Characteristics

In our study, we treat all user characteristics as control variables. We categorize user characteristics into user descriptive characteristics (demographics and availability) and user attitudes and beliefs (self-efficacy, privacy concerns, and perception of social influence).

User Demographic Characteristics. These characteristics could impact the perception of technologies and virtual shopping. For example, older, lower-income, and less-educated shoppers could have more negative attitudes towards technologies and virtual shopping, which could impact the virtual items purchase intentions. At the same time, race (Reza et al., 2022) and gender can strongly

influence purchasing behavior, where Non-White and Non-Male users can have a higher need for user identity representation, resulting in higher purchasing of virtual items to create and maintain their identity representation (Reza et al., 2022).

Availability. Availability is one of the facilitation conditions (Venkatesh et al., 2003) that could affect technology adoption behavior. Some users might not have the resources to use metaverse/social virtual world platforms frequently. For example, many 3D metaverse/social virtual world platforms require users to have proper 3D equipment to enter these environments. Since this equipment could be expensive and not easily available at any time, its availability may impact platform usage frequency and virtual items purchasing behavior. Another type of resource is the knowledge available to use metaverse/social virtual world platforms and engage in purchasing behavior. Since using virtual worlds and purchasing virtual items are relatively new types of behavior, many people might not have enough knowledge to operate in these environments.

Self-efficacy. Similar to the concept of availability, self-efficacy is an important variable explaining how comfortable users feel when operating in virtual environments. Users who feel comfortable and self-efficient might have a better evaluation of their overall experience in virtual worlds, leading to a higher intention to use these worlds and higher purchasing intentions of virtual items.

Social influence. According to the theory of reasoned action (TRA), the user's attitudes, as well as the opinions of important individuals, impact the user's behavior intentions (Hamari, 2015). One of the aspects of TRA theory that impacts user behavior is social influence. Social influence refers to the degree to which users perceive that important others believe they should obtain virtual items through

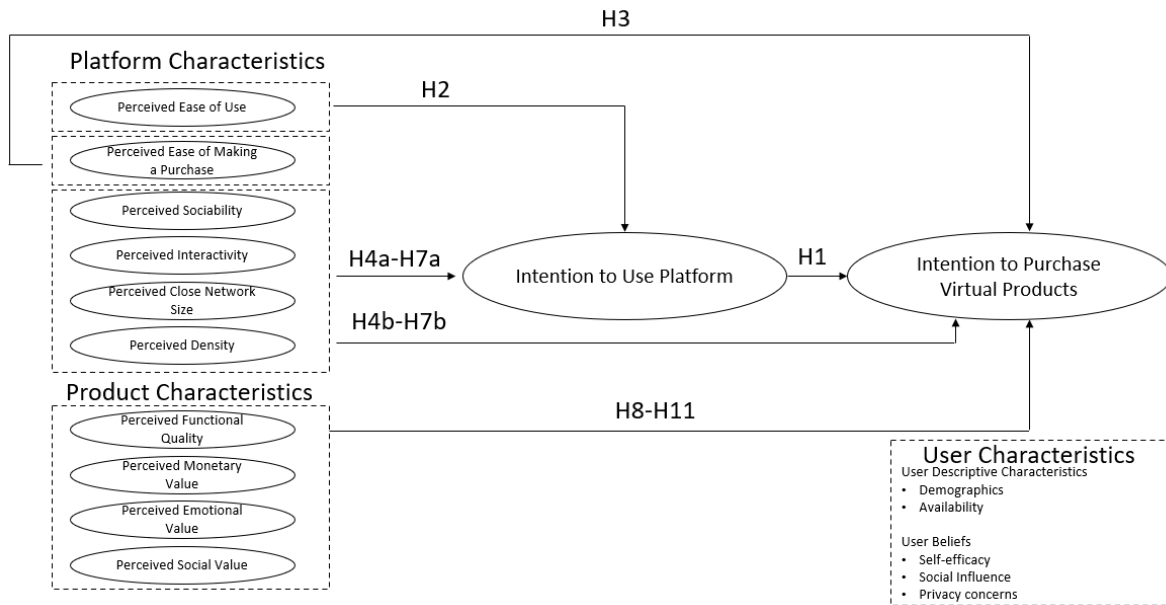
purchasing in the virtual world (Guo & Barnes, 2012). This characteristic can vary among users and is therefore included in user characteristics.

Privacy concerns. Finally, during performing various activities in virtual worlds, user privacy, including location privacy, habits, living styles, etc. may be breached during different data transmission, processing, governance, and storage (Wang et al., 2022). Users' privacy concerns associated with the belief that metaverse/social virtual worlds or virtual product providers might misuse their private information could negatively impact the intention to purchase virtual goods metaverse/social virtual world platforms. In our study, we use the established in literature construct of Privacy concerns consisting of four dimensions: data collection, improper access, data accuracy, and unauthorized secondary usage concerns (Grosso et al., 2020; Smith et al., 1996).

In our study, we expect that user demographic characteristics, availability, self-efficacy, social influence, and privacy concerns to impact the purchasing intention of virtual goods, and therefore we treat these variables as controls.

The full conceptual framework of our study is shown in Figure 1.

Figure 1. Conceptual Model



4. Empirical Research

4.1. Experimental Procedures

To understand the intention to use metaverse/social virtual world platforms and the intention to purchase virtual products in the future, we conducted a survey of the metaverse/social virtual worlds users.

The study participants were recruited on the Prolific platform and completed the study in exchange for a small payment. To conduct this study, first, we needed to prescreen the participants who use virtual items for their avatars (only for decorating purposes) on the metaverse/social virtual world platforms. The pre-screening procedure questions were sent only to participants in the US, UK, and Canada who were older than 24 years old (to ensure that the respondents were financially independent) and who identified themselves as online gamers. 1000 participants were asked if they have used Fortnite, Roblox, Decentraland, Sandbox, Second Life, or other similar metaverse/social virtual world platforms and if they had used virtual items for their avatars (only for decorating purposes) during the last six months. As

an outcome of the pre-screening procedure, out of 1000 responses, 350 participants (who had used virtual items on the mentioned platforms in the past) were selected, and to whom the invitations to take part in the survey were sent.

As a result, we collected responses from 302 participants. Participants were asked to evaluate their experience using metaverse/social virtual world platforms, their experience using virtual items for avatars, their future intention to use metaverse/social virtual world platforms, and their intention to purchase virtual items for use on those platforms. The descriptive statistics of the respondents can be found in Appendix 2.

4.2. Variables and Measures

To ensure the reliability of measurement, the construct variables with corresponding questions were taken from previous literature and adapted to the context of purchasing behavior in metaverse/social virtual world platforms. The operationalization of variables employed in the Main Study can be found in Appendix 3. As independent variables, we included six platform characteristics and four product characteristics. Nine out of ten independent variables consisted of several questions measured on a 7-point Likert scale (1=Strongly disagree, 4=Neutral, 7=Strongly agree). The variable "Perceived close network size" consisted of three questions and was measured on a 7-point scale (1=None, 7=all). The dependent variables "Intention to Use Platforms" and "Intention to Purchase Virtual Products" each consisted of three questions measured on a 7-Point Liker Scale (1=Strongly disagree, 4=Neutral, 7=Strongly agree). We included nine user characteristics as control variables, four of which were construct variables, while another four were demographic characteristics. The variables' constructs can be found in Appendix 3.

4.3. Measurement Model

The data were analyzed using structured equation modeling using Stata software.

We began the analysis by checking the measurement model and its convergent and discriminant validity. Convergent validity demonstrates the degree to which items of latent variables that are theoretically related are related in reality, while discriminant validity shows if the items measure the construct in question or other constructs (Mäntymäki & Salo, 2011).

Convergent validity was evaluated based on 3 criteria: Cronbach alpha should exceed 0.7, composite reliabilities (DG and Composite reliability rho_A) should exceed 0.8, and the average variance extracted of each construct should be greater than the variance due to measurement error and exceed 0.5 (Fornell & Larcker, 1981; Mäntymäki & Salo, 2011). As shown in Appendix 4, all items passed the test for convergent validity.

To evaluate discriminant validity, we used the approach applied by Fornell and Larcker (1981). According to Fornell and Larcker (1981), to have discriminant validity, the square root of the AVE for each construct should exceed the correlation between that and any other construct. The AVE for each construct should be higher than the variance shared between the construct and other variables in the model. As shown in Appendix 5, the square roots of each AVE value (indicated in bold) are greater than the off-diagonal elements, indicating discriminant validity among variables. Therefore, the test for discriminant validity was also met.

4.4. Data Analysis and Results

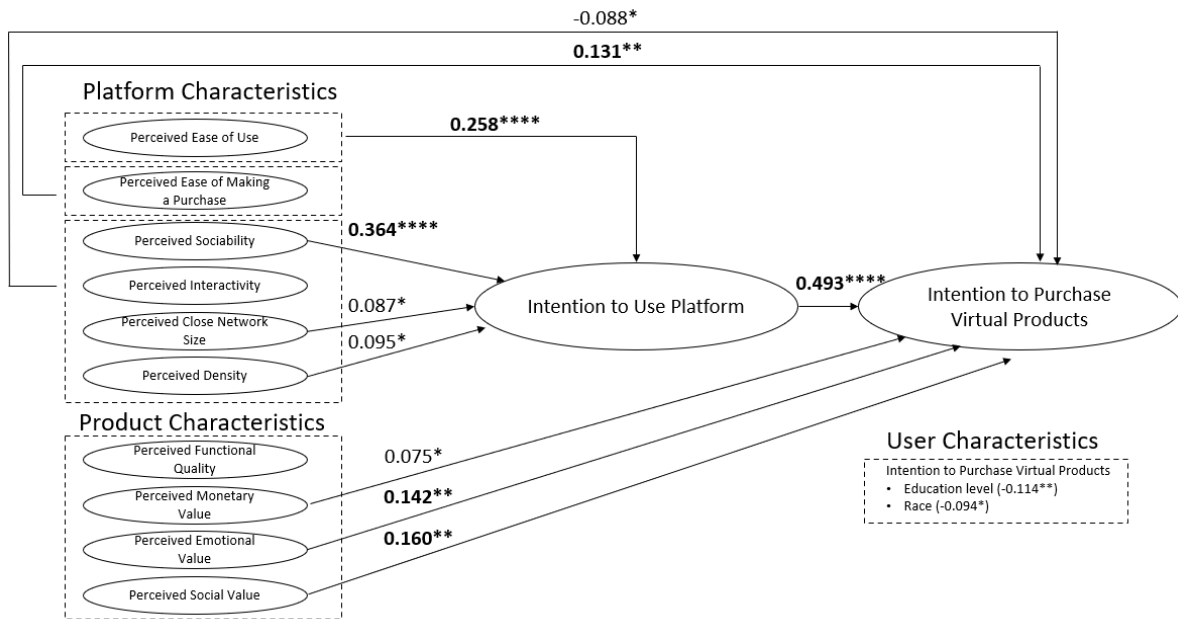
After checking the validity and reliability of the measurement model, we proceeded to check the structural model. All model testing was conducted using the PLS-SEM model. Using SEM allows the testing of complex relationship patterns as a whole

because it can explore several indicator variables per construct simultaneously rather than only one at a time (Cheon, 2013). The advantage of the component-based (PLS-SEM) compared to the co-variance-based structural model (CB-SEM) is that it is non-parametric, does not make restrictive assumptions about data distribution, and requires a smaller minimum sample size (Hamari, 2015).

Additionally, in contrast to the co-variance-based SEM, which is more suited for testing which models better fit the data, PLS-SEM is focused more on prediction-oriented studies and provides more accurate measurement of path coefficients in the model (Hamari, 2015).

PLS-SEM was conducted with 5000 bootstrapping subsamples to estimate the significance of the path coefficients. The R^2 of intention to use the platform was 36%, while the R^2 of intention to purchase virtual goods was 58%, which indicates that the model as a whole has good predictive validity. The results of the structural model are presented in Figure 2. Only paths with p -value < 0.1 are shown.

Figure 2: The Results of PLS-SEM Analysis



* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; **** $p < 0.001$

Overall, six out of fifteen hypotheses received empirical support with a p-value less than 0.05. Two hypotheses were partially supported with p value < 0.1 level.

As predicted, the most crucial factor influencing purchasing intention was the intention to use the platform (H1), suggesting that a higher intention to use the platform leads to a higher intention to purchase virtual items.

Among platform characteristics, perceived sociability (H4a) had the strongest impact on the intention to use the platform, followed by the ease of platform use (H2), while perceived ease to purchase virtual goods (H3) had the strongest impact on the intention to purchase virtual goods.

Perceived close network size (H6a) had a significance level only of $p < 0.1$. This can be explained by the suggestion that using the metaverse/social virtual worlds platforms was not new for respondents, which may have reduced the importance of this platform characteristic. Additionally, participants in metaverse/social virtual worlds can interact with people on the platform whom they do not know in real life,

which is why having close friends on the platform may be less important for them (Mäntymäki & Salo, 2011). Interestingly, contrary to the original hypotheses, platform density had a positive impact on the intention to use the platform (H7a), while platform interactivity (H5b) had a negative impact on the intention to purchase. It can be suggested that there are still not too many users on the platforms, which is why density is not perceived as a negative factor, but rather a positive thing, because it could facilitate more social interactions. Interactivity had a negative impact on purchasing intention, possibly because through interaction with other objects and customization of places and avatars users can also express themselves without purchasing virtual items. Therefore, in this sense, the interactivity of the platform could have a substitution effect on the purchasing of virtual items.

Among product characteristics, our study provided support for our theory that for symbolic consumption, the product needs to provide social and emotional value (H10 and H11). To comply with previous research, we also tested the impact of virtual functional quality and monetary value on the intention to purchase virtual items. While virtual functional quality (H8) did not have any significant impact, the monetary value of the items (H9) had a partial impact. Therefore, it can be suggested that while the majority of users purchase virtual items for symbolic consumption and to satisfy their emotional and social needs, there are still some users who try to obtain monetary value from their virtual items.

Regarding user characteristics, the characteristics with statistically significant impact were some demographic characteristics, where users with higher education (with $p < 0.05$) and non-white users (with $p < 0.1$) had less tendency to purchase virtual goods. The results of the hypotheses check can be found in Table 1.

Table 1. Summary of Hypotheses Tests

Hypothesis	Path coefficient	p-Value	Support
H1: Intention to Use Platform→Intention to Purchase Virtual Product	0.493	0.000	Yes
H2: Perceived Ease of Platform Use→Intention to Use Platform	0.258	0.000	Yes
H3: Perceived Ease of Making Purchase→Intention to Purchase Virtual Product	0.131	0.022	Yes
H4a: Perceived Sociability→Intention to Use Platform	0.364	0.000	Yes
H4b: Perceived Sociability→Intention to Purchase Virtual Product	-0.044	0.528	No
H5a: Perceived Interactivity→Intention to Use Platform	-0.006	0.908	No
H5b: Perceived Interactivity→Intention to Purchase Virtual Product	-0.088	0.096	Contrary Partial
H6a: Perceived Close Network Size→Intention to Use Platform	0.087	0.070	Partial
H6b: Perceived Close Network Size→Intention to Purchase Virtual Product	0.073	0.179	No
H7a: Perceived Density→Intention to Use Platform	0.095	0.052	Contrary Partial
H7b: Perceived Density→Intention to Purchase Virtual Product	-0.080	0.137	No
H8: Perceived Functional Quality→Intention to Purchase Virtual Product	0.038	0.472	No
H9: Perceived Monetary Value→Intention to Purchase Virtual Product	0.075	0.067	Partial
H10: Perceived Emotional Value→Intention to Purchase Virtual Product	0.142	0.024	Yes
H11: Perceived Social Value→Intention to Purchase Virtual Product	0.160	0.039	Yes

5. Discussion

The goal of this research was to update existing research on virtual consumption and create a comprehensive framework by looking at virtual consumption through the prism of user self-extension and symbolic consumption in metaverse/social virtual worlds, where the characteristics of the virtual world need to be designed to enhance users' self-extension, impression management, and communication. The research question of our study was to investigate which platform and virtual product characteristics impact user virtual purchasing behavior in the metaverse/social virtual worlds.

We suggested that virtual possessions represent a tool for users that helps them to express and extend their self/selves in virtual worlds and communicate their self/selves to the virtual community via symbolic consumption. However, before having a need to express the self/selves, the value of using the platform needs to be sufficient enough for the users. In our study, we suggested that to be willing to extend their selves, invest in their avatars, and purchase virtual clothing/accessories,

first users need to have the intention to use the platform in the future. As expected, according to the results of the study, the “Intention to use the metaverse/social virtual world platform” was the most impactful factor in the intention to purchase virtual items. This corresponds to the results of previous academic research (Kaburuan et al., 2009) and signals producers of virtual items to carefully choose the platform where they offer their products.

At the same time, we suggested that due to the nature of metaverse/social virtual world platforms, apart from the symbolic values of the products, the crucial component of the value created for users on the platform is the social context. Therefore, we proposed that platform characteristics need to improve the number and quality of social interactions, while products need to be designed for efficient communication of the symbolic values of the products. According to the results of our study, as predicted, the most significant platform characteristics were the sociability of the platform, while the most significant product characteristics were symbolic components such as social and emotional values.

The social context within the metaverse is of paramount importance as it serves as a foundation of this immersive digital realm. At its core, the metaverse needs to be designed as a space where people gather, interact, and engage, mirroring the dynamics of the physical worlds but in a virtual world landscape, where social interactions are the glue that binds the metaverse together, fostering a sense of belonging and community. One of the topics discussed currently in the industry is that some current metaverse/social virtual world platform providers are too focused on creating virtual spaces, while there is not enough content and there is no strong reason for users to use the platforms. Our study supports these discussions and proposes that users obtain value from metaverse/social virtual world platforms only

when there is enough content and opportunities for the users to interact with each other. It is suggested that metaverse/social virtual world platforms need to make a stronger focus on the sociability of the platform and create relevant content, events, and other social interaction opportunities, which can engage users and result in higher user intention to use the platform and have purchasing activity on those platforms.

At the same time, the main components of symbolic consumption are the messages communicated to the virtual community about the social and emotional values of the virtual products. The social value of virtual products is important for users to express themselves, signal their individuality, and feel of being part of the community. Thus, brands and virtual item providers can focus on strong messages about individuality, community, or luxury positioning for virtual items. Additionally, aesthetic and playful characteristics of the virtual items, or the emotional value of the products, enhance the users' self-image as well and help users not only feel good about themselves but also communicate this self-image to others. Therefore, brands and virtual item providers need to emphasize the product characteristics that make users feel good about themselves and provide positive emotions, such as being aesthetically beautiful or funny.

Apart from creating social context and emphasizing the social and emotional value of the product, providers of metaverse/social virtual world platforms need to pay close attention to some platform design characteristics that make interactions on the platform comfortable. Our study realized that platform design characteristics that make a statistically significant impact on the purchasing intention of virtual goods directly or indirectly are the ease of platform use and the ease of making a purchase. While the ease of platform use was widely discussed in previous academic literature,

the ease of making a purchase variable was overlooked in previous research. In our study, we found support for both hypotheses. The metaverse/social virtual world is still a novel technological experience, and to make the adoption faster and more enjoyable, providers of metaverse/social worlds need to make them easy to use. Additionally, at the current moment, when there are still many obstacles in obtaining cryptocurrency, the ease of purchase on the platform makes a significant impact on user purchasing behavior, so platform providers need to find ways to simplify this process to enhance the virtual purchases at the platform.

The limitation of this study is that with the aim of including only a financially active population, we focused on surveying people older than 24 years old, excluding the majority of Generation Z and all of Generation Alpha. Since these two generations are digital natives, it is expected that they have more positive attitudes toward metaverse/social virtual worlds, be more frequent users of these platforms, and be more frequent buyers of virtual goods. All these factors might lead to slightly different from those revealed in this study interlinks between platform and product characteristics impacting virtual consumption. Because surveying people younger than 18 is challenging, but they still can be active purchasers of virtual goods, using their parents' money, additional research studying these demographics might be useful.

Nevertheless, we believe that our study adds value for industry participants and academic researchers. From a managerial perspective, we believe that our study adds value because due to the novelty of the topic, there is not enough completed research or working business cases related to the metaverse/social virtual world platforms and virtual product characteristics impacting the purchasing behavior in the metaverse/social virtual worlds platforms. The results of our study provide platform

creators and virtual product providers with a comprehensive framework and insights to apply in their strategies in the metaverse/social virtual worlds to increase positive user behavior in the forms of intention to use and intention to perform purchasing activity on the platform.

Also, this study makes a significant contribution to academic research on virtual consumption by integrating prior findings into a unified framework and offering new perspectives. First, it consolidates previous research, which has often been fragmented, into a comprehensive framework that highlights key platform and virtual product characteristics of metaverse/social virtual worlds that influence virtual consumption. Previous studies have typically examined isolated aspects of virtual worlds; however, this paper presents an extensive bibliographic review, integrates those findings into a cohesive framework, and empirically tests it within the context of current metaverse platforms. Second, this paper adds new input to existing research on virtual consumption by looking at virtual consumption through the new angle of self-extension and symbolic consumption theories and emphasizing the importance of social context on the metaverse/social virtual worlds to boost virtual consumption. Unlike earlier research, which has overlooked the social dimension of these platforms, this study emphasizes that metaverse/social virtual worlds are not merely technological platforms but vibrant social spaces. They are rather platforms where users come to socialize, extend their selves in the virtual worlds, and make an impression on others to obtain positive feedback. Therefore, in our study, we argue that to boost virtual consumption, platform and product characteristics need to improve social context and interactions on the platform and create a stimulating environment for users' self-extension in the virtual worlds. By doing so, we hope our study will inspire future academic research that further explores this social dimension

of the metaverse/social virtual worlds, ultimately leading to a more holistic understanding of virtual consumption within the metaverse/social virtual worlds.

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APPENDICES

Appendix 1: Previous Research on Shopping in Virtual Worlds

No	Title	Journal	Year	Authors	Description	Dependent Variable	Method	Context
1	Identifying user's behavior purchasing virtual items	The 9th International Conference on Electronic Business	2009	Kaburuan, Chen & Jeng	The authors used the extended Theory Planned Behavior extended model to understand how personal innovativeness, perceived consequences, subjective norms, and behavioral control influence customers' behavior and how to predict it toward purchasing in virtual worlds.	Virtual goods purchase intention, virtual goods purchasing	Survey	Metaverse
2	Virtual item sales as a revenue model: identifying attributes that drive purchase decisions	Electronic Commerce Research	2009	Lehdonvirta	The author used a perspective from the sociology of consumption to identify a set of item attributes that drive virtual item purchase decisions, consisting of functional, hedonic and social attributes.	Virtual goods purchasing	Interviews	Video Games
3	An Odyssey into Virtual Worlds: Exploring the Impacts of Technological and Spatial Environments on Intention to Purchase Virtual Products ¹	MIS Quarterly	2011	Animesh et al.	On the basis of symbolic consumption literature and SOR framework, the authors explained how the environmental stimuli (technological and spatial) of the virtual world influence the virtual experience of participants (cognitive and emotional states of organism such as telepresence, flow, social pressure) and, subsequently, leads to positive response (intention to purchase virtual goods).	Virtual goods purchase intention	Survey	Metaverse
4	Purchase behavior in virtual worlds: An empirical investigation in Second Life	Information and management	2011	Guo & Barnes	Authors used the UTAUT model as the theoretical base for constructs for explaining players' adoption of the in-world purchase channel and salient motivations underlying virtual world players' intentions to pursue virtual items. Authors suggested that extrinsic motivators, intrinsic motivators, and social influence impact purchase behavior intention, which impact the actual purchase behavior, moderated by habit.	Virtual goods purchase intentions, Virtual goods purchasing	Survey	Video Games
5	Online experiences and virtual goods purchase intention	Internet Research	2012	Huang	The authors used SOR model and showed how environmental features impact users' online experiences and purchase intentions. Stimuli impact the organic experiences (affective involvement, flow, cognitive involvement), which affect the response (purchase intention). Specifically, social identity showed the strongest influence on involvement and flow and affective involvement showed the greatest influence on purchase intention compared to flow and cognitive involvement.	Virtual goods purchase intention	Survey	Facebook games
6	Investigating the intention to purchase digital items in social networking communities: A customer value perspective	Information and management	2011	Kim, Gupta & Koh	The authors used customer value theory to understand factors impacting virtual items purchase intention. 6 factors (price utility, functional quality, playfulness, social self-image expression, social relationship support) were extracted from three dimensions of customer value (functional, social, and emotional). Factors corresponding to emotional and social value made significant impact on member purchase intention.	Virtual goods purchase intention	Survey	Metaverse

7	An examination of the effects of virtual experiential marketing on online customer intentions and loyalty	The service industries journal	2011	Luo et al.	Virtual experiential marketing elements (sense, interaction, pleasure, flow, community relationship) have positive effects on both the consumer's browse and purchase intentions. This in turn have a positive effect on (i.e. increase) customer loyalty.	Virtual goods purchase intentions, browsing intentions, loyalty	Survey	Virtual games
8	VEM elements have positive effects on both the consumer's browse and purchase intentions. This in turn will have a positive effect on (i.e. increase) customer loyalty	Computers in Human Behavior	2011	Mäntymäki & Salo	This study builds upon Technology Acceptance Model, motivational model and theory of network externalities to examine continuous usage and purchase intention. The results reveal an impact of continuous usage (impacted by perceived enjoyment, usefulness and ease of use) and the presence of other users on purchasing.	Platform continuous use, virtual goods purchase intentions	Survey	Metaverse
9	Exploring the value of purchasing online game items	Computers in Human Behavior	2011	Park & Lee	Authors have modified the theory of consumption values (TCV) in order to investigate online game users' perceived value of purchasable game items and developed a new construct – the "integrated value of purchasing game items". They found that the enjoyment, character competency, visual authority, and monetary values are appropriate for describing how online game users perceive the value of game items.	Virtual goods purchase intentions	Survey	Virtual games
10	Explaining Purchasing Behavior within World of Warcraft	Journal of Computer Information Systems	2012	Guo & Barnes	By using the UTAUT theory, the authors developed a conceptual model of purchase behavior in virtual worlds, where effort expectancy, performance expectancy, advancement, perceived value, customization, habit, enjoyment and perceived social status have strong impact on players' purchase intention and actual purchase behavior.	Virtual goods purchase intention, virtual goods purchasing	Survey	Metaverse
11	Energizing business transactions in virtual worlds: an empirical study of consumers' purchasing behaviors	Information Technology and Management	2013	Cheon	The study examines how the platform context characteristics (interactivity, vividness, involvement), product context (product value), and virtual experience (flow and satisfaction) affect consumers when they purchase virtual products.	Flow, willingness of purchase the virtual products	Survey	Metaverse
12	Purchasing behavior in social virtual worlds: An examination of Habbo Hotel	International Journal of Information Management	2013	Mäntymäki & Salo	The authors used Unified Theory of Acceptance and Use of Technology (UTAUT) to examine the role of motivation, social influence, measured with perceived network size as well as user interface and facilitating conditions in predicting the intention to engage in purchasing in social virtual worlds.	Virtual goods purchase intention	Survey	Metaverse
13	A dual identification framework of online multiplayer video games: The case of massively multiplayer online role playing games (MMORPGs)	Journal of Business Research	2014	Badrinarayan, Sierra & Martin	Player characteristics and game elements impact identification (with platform and community) which impacts consumption behavior (purchase, community engagement, co-production, recruitment, WOM)	Virtual goods consumption behavior (purchase, community engagement, co-production, recruitment, WOM)	Survey	Video Games
14	Virtual goods, real goals: Exploring means-end goal structures of consumers in	Information and management	2014	Jung & Pawlowski	The authors used means-end chain analysis (MECA) approach to show that the attributes of activities or objects represent the means (decorative activity, role playing, better	Virtual goods consumption	Interviews	Metaverse

	social virtual worlds				avatar looks, my own place) by which individuals achieve benefits and important personal values (amusement, self-expression, socialization, escapism, self-esteem, relaxing).			
15	Understanding consumption in social virtual worlds: A sensemaking perspective on the consumption of virtual goods	Journal of Business Research	2014	Jung & Pawlowski	This study employs a social representations approach to reveal key elements of SVW users' collective sensemaking about virtual consumption. Results show that 32 concepts represent three core elements: amusement, virtuality, and consumer activity.	Virtual consumption social representation	Survey, free word association technique	Metaverse
16	Young People Purchasing Virtual Goods in Virtual Worlds: The Role of User Experience and Social Context	International Federation for Information Processing	2014	Mäntymäki, Merikivi & Islam	According to the study, user experience in the form of cognitive absorption and social context (network size, social presence, and trust in other users) make impact on purchasing intentions.	Virtual goods purchase intentions	Survey	Metaverse
17	A study of virtual product consumption from the expectancy disconfirmation and symbolic consumption perspectives	Information Systems Frontiers	2014	Wang & Chang	Using the expectancy disconfirmation model and symbolic consumption theory, this study presents a model of customer satisfaction and repurchase intention. This study validates the influence of perceived customization and perceived sociability on customer satisfaction, mediated via outcome expectations and perceived quality. Customer satisfaction, on its term, is a critical mediator of the indirect influence of the other four constructs in the proposed model on the consumers' repurchase intention.	Virtual goods repurchase intention	Survey	Consumers of virtual products
18	Hedonic Consumption in Virtual Reality	Journal of Internet Commerce	2015	Ben-Ur, Mai & Yang	This study uncovers three categories of drivers of hedonic consumption in virtual reality, including product attributes, developer strategies, and virtual game community; and three dimensions of outcome, including product-related experience, and behavioral and emotional experiences. The findings also suggest that community involvement intensifies consumers' hedonic experiences.	Experience with consumption of hedonic products: product-related experience, behavioral, and emotional experiences	Secondary data (text analysis of online reviews)	Metaverse
19	Why do people buy virtual goods? Attitude toward virtual good purchases versus game enjoyment	International Journal of Information Management	2015	Hamari	According to the study, enjoyment of the game, attitude toward virtual goods, the beliefs about peers' attitudes, and continued playing intention impact the willingness to purchase virtual goods in gaming environment.	Virtual goods purchase intention	Survey	Metaverse, Games, Facebook Games
20	Can't Buy Me Love...Or Can I? Social Capital Attainment Through Conspicuous Consumption in Virtual Environments	Information Systems Research	2015	Hinz, Spann & Hann	The study examine the effect of conspicuous consumption on the development of social capital. Players who bought the prestige goods increased the number of the social nodes. Even when accounting for self-selection, the results revealed a significant, large effect of conspicuous consumption on enhanced social capital.	Social capital	Secondary data, experiment	Metaverse
21	Online identity construction: How gamers redefine their identity in experiential communities	Journal of Consumer Behavior	2015	Costa Pinto et al.	Gamers assemble their identities in online communities by combining different self-dimensions and using two different strategies: self-extension and self-aggregation. Gamers use their avatars and virtual possessions to develop and demonstrate their status in the experiential community, extending their online selves through virtual possessions. Construction and	Online identity construction	Interviews, conversations, observations	Video Games

					manipulation of the avatar and other virtual possessions can help payers to diminish the tension caused by the gap between their self-perception of who they are offline (real self) and who they are trying to become (ideal self).			
22	Nonlinear Effects of Social Connections and Interactions on Individual Goal Attainment and Spending: Evidence from Online Gaming Markets	Journal of Marketing	2017	Zhang et al.	Social connections and interactions positively influence consumer goals and spending. However, their positive effects diminish after a certain point in a salient, nonlinear pattern. Novices are more subject to the effects of social connections and interactions, yet such effects also diminish more severely for unseasoned people. Some social connections and interactions can provide information support for goal attainment, but too many of them can introduce information overload and, thus, hamper goal attainment intention.	Spending on virtual goods	Secondary data	Video Games
23	UTAUT in Metaverse: An "Ifland" Case	Journal of Theoretical and Applied Electronic Commerce Research	2022	Lee & Kim	The authors focus on UTAUT theory, where the four independent variables (performance expectation, expected effort, social impact, and facilitating conditions) influence user satisfaction. Satisfaction on its term impacts the user's behavioral intention.	Virtual goods' user behavior intentions: usage, purchase, WOM	Survey	Metaverse

Appendix 2: Operationalization of Survey Variables

	Sub-Construct	Question
Intention to purchase virtual products Adopted from Guo & Barnes, 2011		Please, rate how much you agree with the following statements (1=Strongly disagree, 7=Strongly agree) <ul style="list-style-type: none"> The probability that I would consider buying a virtual item within next 6 months is high My willingness to buy a virtual item within next 6 months is high The likelihood of my purchasing a virtual item within next 6 months is high
Intention to use platform Adopted from Mäntymäki & Salo, 2011		<ul style="list-style-type: none"> I intend to continue using the social virtual worlds/metaverse platforms during the next three months. I intend to continue using the social virtual worlds/metaverse platforms frequently during the next three months I will keep on using the social virtual worlds/metaverse platforms in the future.
Platform characteristics	Perceived ease of use Adopted from Venkatesh et al., 2003	Please, evaluate the social virtual worlds/metaverse platforms where you use virtual items (1=Strongly disagree, 7=Strongly agree) <ul style="list-style-type: none"> I find the social virtual worlds/metaverse platforms to be clear and understandable I find that the social virtual worlds/metaverse platforms do not require a lot of mental effort I find the social virtual worlds/metaverse platforms are easy to use
	Perceived ease of making a purchase Adopted from Venkatesh et al., 2003	<ul style="list-style-type: none"> I find the purchasing of virtual goods the social virtual worlds/metaverse platforms clear and understandable I find the purchasing of virtual goods on the social virtual worlds/metaverse platforms does not require a lot of effort I find the purchasing of virtual goods on the social virtual worlds/metaverse platforms easy to perform
	Perceived sociability Adopted from Animesh et al., 2011	<ul style="list-style-type: none"> Social virtual worlds/metaverse platforms enable me to get a good impression of other residents/avatars in the virtual world Social virtual worlds/metaverse platforms enable me to develop good social relationships with other community members Social virtual worlds/metaverse enable me to feel part of the virtual world community Social virtual worlds/metaverse enable me to form close friendships with residents of the virtual world Social virtual worlds/metaverse provide me the opportunity to have lively, scintillating, and engaging meetings
	Perceived interactivity Adopted from Animesh et al., 2011	<ul style="list-style-type: none"> The tools provided by the social virtual worlds/metaverse platforms allow me to modify content that exists in the environment The tools provided by the social virtual worlds/metaverse platforms allow me to create content as per my imagination

	<ul style="list-style-type: none"> • A large number of objects in the social virtual worlds/metaverse platforms can be manipulated by users • Users can make major changes in the virtual objects and the Metaverse virtual environment • Social virtual worlds/metaverse platforms allow me to change or influence the way the environment looks
	<p>Perceived Close Network Size Please, evaluate the network size of the metaverse platforms you have used (1=none, 7=all)</p> <p>Adopted from Mäntymäki & Salo, 2011; Lin & Bhattacharjee, 2008</p> <ul style="list-style-type: none"> • How many of your friends use metaverse platforms? • How many of your peers use metaverse platforms? • How many people in your environment use metaverse platforms?
	<p>Perceived density Please, rate how much you agree with the following statements. (1=Strongly disagree, 7=Strongly agree)</p> <p>Adopted from Animesh, et al., 2011</p> <ul style="list-style-type: none"> • I keep bumping into avatars/people in the area that I frequently visit • Most of the areas that I visit are crowded with avatars • The area that I spend time in does not have enough space to accommodate all the avatars that visit the area.
Product characteristics	<p>Perceived functional quality Please, evaluate the virtual items for AVATARS (clothing, accessories, moves for avatars, objects, etc.) that you use/purchase on the social virtual worlds/metaverse platforms. (1=Strongly disagree, 7=Strongly agree)</p> <p>Developed by authors</p> <p>"I use virtual items mainly because they..."</p> <ul style="list-style-type: none"> • Provide functional value to me • Provide acceptable standard of digital quality • Reliable in their graphic features performance, compatibility and good in terms of their overall excellence
	<p>Perceived monetary value</p> <p>Developed by authors</p> <ul style="list-style-type: none"> • Worth more than they cost • Can be resold later • Provide investment opportunity
	<p>Perceived emotional value</p> <p>Adopted from Kim et al., 2011</p> <ul style="list-style-type: none"> • Enhance my self-esteem, makes me feel good about myself • Are interesting, fun, stimulate my curiosity and imagination • Are beautiful, attractive, and aesthetically appealing
	<p>Perceived social value</p> <p>Developed by authors</p> <ul style="list-style-type: none"> • Help me expressing my individuality and personal values • Help me expressing my belonging to social groups (friends, colleagues, teammates) • Help me to form/maintain/enhance social relationship with others and make new friends
User characteristics	<p>Perception of social influence Please, rate how much you agree with the following statements (1=Strongly disagree, 7=Strongly agree)</p> <p>Adopted from Guo & Barnes, 2011</p> <ul style="list-style-type: none"> • Most of my friends and acquaintances think that purchasing virtual items in metaverse platforms is a good choice • People who are important to me recommend that purchasing in metaverse platforms is a good way to find items I am looking for
	<p>Self-efficacy</p> <p>Adopted from Animesh, et al., 2011</p> <ul style="list-style-type: none"> • I feel comfortable using metaverse platforms on my own even if there is no one around me to tell how to use it • I can easily operate in metaverse platforms on my own
	<p>Availability</p> <p>Adopted from Venkatesh et al., 2003</p> <ul style="list-style-type: none"> • I have the resources necessary to use the system • I have the knowledge necessary to use the system
	<p>Privacy concerns</p> <p>Adapted from Grosso et al., 2020</p> <ul style="list-style-type: none"> • During the use of this technology, I will have a concern that the retailer collects too much personal information about me • During the use of this technology, I will have a concern that unauthorized people could access my personal information collected by the retailer • During the use of this technology, I will have a concern about the accuracy of my personal data in the retailer's database • During the use of this technology, I will have a concern that the retailer can use my personal information for other purposes
	<p>Gender</p> <p>Please, identify your gender.</p> <ol style="list-style-type: none"> Female Male Non-binary /third gender Prefer not to say
	<p>Age</p> <p>Please, identify your age.</p> <ol style="list-style-type: none"> Younger than 25 25-34 35-44 45-54 55-and older

Income	Which of these describes your personal income last year? a) \$0 b) \$1 to \$ 9 999 c) \$10 000 to \$ 24 999 d) \$25 000 to \$ 49 999 e) \$50 000 to \$ 74 999 f) \$75 000 and greater g) Prefer not to answer
Education	Please, identify your highest achieved level of education. a) Not completed High School b) High school c) Technical college d) Bachelor's degree e) Master's degree and higher
Race	Choose one race that you consider yourself to be a) White or Caucasian b) Black or African American c) American Indian/Native American or Alaska Native d) Asian e) Hispanic, Latino, or Spanish origin f) Middle Eastern or North African g) Native Hawaiian or Other Pacific Islander h) Other i) Prefer not to answer

Appendix 3: Descriptive Statistics

Variable	Frequency in%	Variable	Frequency in%
<i>Gender</i>		<i>Platform Used</i>	
Male	48.01	Decentraland	1.32
Female	51.99	Fortnite	46.69
<i>Age</i>		Roblox	22.19
Younger than 25	2.65	Sandbox	20.2
25-34	43.71	Second Life	4.97
35-39	34.44	Other	22.19
45-54	13.91		
55 and older	5.3		
<i>Education</i>		<i>Product Purchased</i>	
High School	26.16	Clothing/skins for avatars	73.84
Technical College	23.51	Accessories/decorations	14.9
Bachelor's degree	36.42	Animations/emojis	5.96
Master's degree and higher	13.91	Gadgets/cars	3.97
<i>Income</i>		Other	1.32
\$0 or prefer not to answer	4.64		
\$1 to \$ 9 999	9.27		
\$10 000 to \$ 24 999	23.84		
\$25 000 to \$ 49 999	39.07		
\$50 000 to \$ 74 999	16.56		
\$75 000 and greater	6.62		
<i>Race</i>			
White	88.74		
Not White	11.26		

Appendix 4: Descriptive Statistics and Convergent Validity of the Main Variables

Construct	Item	Mean	Standard deviation	Factor Loading	Cronbach's alpha	DG	Composite reliability rho_A	AVE
Perceived ease of Use	<i>EU1</i>	5.666	1.058	0.901	0.781	0.867	0.874	0.69
	<i>EU2</i>	5.159	1.41	0.646				
	<i>EU3</i>	5.715	1.102	0.918				
Perceived ease of making a purchase	<i>EP1</i>	4.934	1.035	0.87	0.861	0.914	0.88	0.781
	<i>EP2</i>	4.775	1.202	0.853				
	<i>EP3</i>	5.944	1.069	0.927				
Perceived sociability	<i>Soc1</i>	4.444	1.204	0.746	0.894	0.922	0.903	0.703
	<i>Soc2</i>	5.215	1.394	0.879				
	<i>Soc3</i>	5.556	1.242	0.866				
	<i>Soc4</i>	4.921	1.572	0.851				
	<i>Soc5</i>	5.02	1.54	0.843				
Perceived interactivity	<i>Int1</i>	5.404	1.282	0.839	0.844	0.885	0.897	0.608
	<i>Int2</i>	5.321	1.332	0.83				
	<i>Int3</i>	4.841	1.403	0.682				
	<i>Int4</i>	4.98	1.435	0.8				
	<i>Int5</i>	5.212	1.32	0.737				
Perceived Close Network Size	<i>NS1</i>	3.964	1.61	0.925	0.91	0.943	0.912	0.847
	<i>NS2</i>	3.907	1.684	0.908				
	<i>NS3</i>	3.993	1.671	0.928				
Perceived density	<i>Dens1</i>	4.195	1.666	0.896	0.717	0.815	0.795	0.607
	<i>Dens2</i>	4.149	1.598	0.869				
	<i>Dens3</i>	3.238	1.573	0.514				
Perceived functional quality	<i>FC1</i>	3.795	1.815	0.624	0.772	0.862	0.893	0.681
	<i>FC2</i>	4.921	1.33	0.895				
	<i>FC3</i>	5.142	1.315	0.925				
Perceived monetary value	<i>MV1</i>	3.129	1.628	0.845	0.856	0.911	0.868	0.775
	<i>MV2</i>	2.917	1.8	0.885				
	<i>MV3</i>	2.755	1.808	0.909				
Perceived emotional value	<i>EV1</i>	4.662	1.576	0.793	0.774	0.869	0.775	0.689
	<i>EV2</i>	5.632	1.15	0.832				
	<i>EV3</i>	4.626	1.148	0.864				
Perceived social value	<i>SV1</i>	5.394	1.386	0.8	0.817	0.892	0.817	0.734
	<i>SV2</i>	4.56	1.633	0.897				
	<i>SV3</i>	4.407	1.697	0.87				
Perception of social influence	<i>SI1</i>	4.205	1.603	0.949	0.874	0.941	0.881	0.888
	<i>SI2</i>	3.911	1.661	0.936				

Self-efficacy	SE1	5.781	1.195	0.94	0.858	0.934	0.861	0.876
	SE2	4.911	1.07	0.931				
Availability	Avail1	5.765	1.165	0.929	0.852	0.931	0.855	0.871
	Avail2	5.808	1.119	0.938				
Privacy concerns	PC1	3.993	1.657	0.925	0.902	0.924	1.169	0.753
	PC2	4.017	1.594	0.83				
	PC3	3.679	1.632	0.859				
	PC4	4.175	1.67	0.853				
Intention to use platform	PU1	5.947	1.288	0.95	0.94	0.96	0.94	0.9
	PU2	5.791	1.381	0.94				
	PU3	5.944	1.263	0.95				
Intention to purchase virtual products	IP1	5.55	1.579	0.971	0.97	0.98	0.97	0.943
	IP2	5.483	1.578	0.965				
	IP3	5.54	1.594	0.977				
Gender		1.52	0.5	N/A	N/A	N/A	N/A	N/A
Income		3.735	1.18	N/A	N/A	N/A	N/A	N/A
Education		2.381	1.02	N/A	N/A	N/A	N/A	N/A
Race		1.113	0.317	N/A	N/A	N/A	N/A	N/A
Age		2.755	0.915	N/A	N/A	N/A	N/A	N/A

Appendix 5: Discriminant Validity of the Main Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1 Ease of use	0.69																				
2 Ease of making a purchase	0.44	0.78																			
3 Interactivity	0.23	0.17	0.61																		
4 Sociability	0.24	0.18	0.24	0.70																	
5 Close network size	0.04	0.04	0.04	0.11	0.85																
6 Density	0.03	0.01	0.06	0.16	0.13	0.61															
7 Functional quality	0.12	0.17	0.16	0.30	0.11	0.10	0.68														
8 Monetary value	0.00	0.00	0.04	0.10	0.07	0.09	0.09	0.78													
9 Emotional value	0.18	0.19	0.14	0.28	0.08	0.07	0.31	0.05	0.69												
10 Social value	0.12	0.11	0.16	0.37	0.17	0.17	0.29	0.12	0.38	0.73											
11 Perception of social influence	0.04	0.05	0.08	0.17	0.31	0.05	0.21	0.17	0.11	0.22	0.89										
12 Self-efficacy	0.23	0.27	0.09	0.21	0.03	0.03	0.16	0.00	0.34	0.15	0.06	0.88									
13 Availability	0.22	0.23	0.08	0.18	0.03	0.04	0.16	0.00	0.30	0.11	0.05	0.54	0.87								
14 Privacy concerns	0.05	0.05	0.01	0.03	0.00	0.00	0.02	0.03	0.04	0.00	0.00	0.04	0.04	0.75							
15 Intention to use platform	0.21	0.22	0.11	0.30	0.08	0.09	0.23	0.01	0.33	0.22	0.11	0.39	0.31	0.05	0.90						
16 Intention to purchase virtual products	0.17	0.21	0.07	0.22	0.10	0.05	0.22	0.03	0.32	0.26	0.12	0.28	0.23	0.02	0.50	0.94					
17 Gender	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	1.00				
18 Income	0.00	0.00	0.03	0.01	0.04	0.01	0.02	0.00	0.00	0.01	0.03	0.01	0.05	0.01	0.01	0.01	0.04	1.00			
19 Education	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.01	0.01	0.11	1.00		
20 Race	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.01	0.00	0.01	0.03	0.00	0.00	0.03	1.00	
21 Age	0.00	0.00	0.03	0.00	0.00	0.00	0.03	0.00	0.00	0.02	0.01	0.01	0.00	0.02	0.01	0.02	0.00	0.02	0.00	0.05	1.00

CHAPTER 2

Unveiling the Power of Your Avatar: How User's Avatar Identification Impacts Virtual Consumption in the Metaverse

ABSTRACT

With the increased popularity in recent years, metaverse worlds have created additional opportunities for companies to reach customers. In these worlds, users are represented by avatars and while user's avatar identification, which refers to a cognitive connection between an individual and an avatar (Suh et al., 2011), was studied in academic literature before, the impact of avatar identification on virtual consumption, was not investigated in the previous research and this gap left a significant aspect of virtual consumption unexplored. Our research filled this gap and combined insights from qualitative (30 in-depth interviews) and quantitative (survey of 291 participants) research of the metaverse users. Since consumption in the metaverse assumes exposing the virtual items to other users, we looked at virtual consumption through the prism of self-extension and symbolic consumption theories, where users purchase virtual goods that have symbolic meaning to make an impression on others. The results of our research indicate that the current metaverse worlds' users have different self-representation strategies in the metaverse worlds, resulting in different levels of avatar identification. Furthermore, our research demonstrates that avatar identification is positively related to the intention to purchase virtual clothing/accessories through serial mediation by alerting the need for self-expression and enjoyment. This research is one of the first studies, to our knowledge, investigating the impact of avatar identification on virtual consumption and clarifying the underlying mechanism. Thus, on one side, this research significantly contributes to academic research on the topic of virtual consumption, and on the other side, it provides valuable insights for industry participants.

Keywords: metaverse, virtual consumption, avatar identification

CORE CONTENT

1. Introduction

The metaverse is one of the popular topics that caught attention in recent years, with companies either utilizing the metaverses for operational efficiencies or entering the metaverses to reach new customers. Initially derived from Neal Stephenson's 1992 novel "Snow Crash," the metaverse was described as a three-dimensional virtual world and a gigantic virtual universe parallel to the world in which "Meta" means virtual and abstract, and "verse" means universe (Kemec, 2022). Thus, originally, the concept of the metaverse was a separate parallel virtual world that could drastically differ from the physical world. However, currently, there is no universally accepted definition, many metaverses exist, and the concept of the metaverse varies depending on one's point of view and purpose. For example, while some platforms such as Meta Horizons and Decentraland fit the original "metaverse" concept more closely, by focusing on creating virtual worlds mainly for interactions and social context, other platforms such as Roblox, Sandbox, Fortnite, and similar ones define themselves as metaverses as well, even if their primary activity is gaming. In this article, we define the metaverse as a permanent and immersive mixed-reality world where people can interact synchronously with other people and objects beyond the limitations of time and space by using avatars and immersion-supporting devices, platforms, and infrastructures (Kaplan & Haenlein, 2009). Our definition of the "metaverse" is close to the definition of "social virtual worlds", which can be described as virtual worlds that emphasize interaction with other users and exploration of the virtual environment via customizable avatars (Mäntymäki & Salo, 2013). Therefore, we used the definitions of the metaverse and social virtual world interchangeably in our research.

Users in the metaverse/social virtual worlds are represented by avatars, or virtual versions of users, which they create according to their preferences. Different avatar designs can have an impact on the user-avatar relationship, or avatar identification, and influence user experiences in metaverse/social virtual world platforms. A considerable amount of previous academic literature focused on avatar identification and its impact on different behavioral outcomes such as immersion (Poncin & Garnier, 2012), social interactions (Vasalou et al., 2007), communication (Takano & Taka, 2022), and motivation in the virtual worlds (Birk et al., 2016). However, up till now, academic literature has not yet properly studied the impact and the mechanism through which avatar identification could influence one of the key activities in the metaverse/social virtual worlds – virtual consumption.

The aim of this research is to fill a gap in academic literature and investigate links between avatar identification and virtual consumption. Our research question is to study how users develop different levels of avatar identification, whether avatar identification impacts virtual consumption, and through which mechanism. To reveal and test this mechanism, we looked at virtual consumption through the prism of symbolic consumption (Grubb & Grathwohl, 1967) and self-extension (Belk, 1988) theories and proposed that the ultimate goal of consumption in the metaverse/social virtual worlds is to make an impression on others by exposing the possessions that have symbolic meanings. In our research, we studied the links between self-representation strategies, avatar identification, central motivational goals of virtual consumption, and virtual consumption itself. The results of our research suggest that different self-representation strategies in metaverse/social virtual worlds impact the strength of avatar identification in those worlds. Furthermore, avatar identification has a positive impact on the intention to purchase virtual clothing/accessories

through the serial mediation of self-expression and perceived enjoyment obtained from virtual clothing/accessories. This paper makes a significant contribution to academic research by being one of the first to examine how avatar identification influences virtual consumption. While previous studies have explored the effects of avatar identification on various user behaviors in the metaverse/ social virtual worlds, its specific impact on virtual consumption has not been previously addressed. This research is novel as it utilizes both qualitative and quantitative methods to uncover the reasons behind different levels of avatar identification and demonstrates that higher avatar identification positively influences the intention to purchase virtual goods through the mediating mechanism of self-expression and the enjoyment derived from virtual goods. Additionally, our research provides practical impact, relevance, and insights for companies, marketers, and platform providers, by clarifying the ways of how to effectively utilize avatar and platform designs to create positive user behavior in the form of increased virtual consumption.

The rest of the article is structured as follows: the first section is the introduction with the definitions and aim of the research study; the second section presents the theoretical background, and the third to fifth sections describe the empirical research, consisting of two studies. The final section concludes with a discussion of the results, contributions, and limitations, and includes the section with additional insights, described in detail in the Appendix.

2. Theoretical Background and Key Research Concepts

2.1. Theoretical Background

To understand virtual consumption and the mechanism through which avatar identification impacts it, we have exploited the widely used in social research self-extension and symbolic consumption theories.

Self-Extension Theory

A person's self-image, or self-concept, is a person's attitude, perceptions, and evaluations of him/herself, which can significantly influence the person's behavior (Grubb & Grathwohl, 1967). Additionally, because people exist not only as individuals but also as collectivities, self-image can consist of core-self and multiple aggregate selves, such as family, group, subculture, nation, and human selves (Belk, 1988). At the same time, people have an identity, or self, for each distinct network of relationships, where the person plays a role (Arnett et al., 2003; Stryker & Burke, 2000;). Thus, a person can have multiple selves, and these selves have different degrees of importance to the person and are organized hierarchically, with salient selves, which are located higher in the hierarchy, being more likely to affect the person's behavior than non-salient selves (Arnett et al., 2003).

People have different ways of expressing themselves, and one way to do it is through the things they possess (Belk, 1988; Grubb & Grathwohl, 1967;). According to self-extension theory, people express their selves through possessions and use possession to extend, expand, and strengthen their sense of self through categories such as body, internal processes, ideas, experiences, and those persons, places, and things to which they feel attached (Belk, 1988). Since a person can have multiple selves with different levels of salience, when needed, the person can express and enhance any of these selves with various possessions (Belk, 2013). Thus, various possessions become tools for self-extension through which a person can express and enhance the selves that are central and important to him/her at a certain moment.

Symbolic Consumption Theory

The construction of self-image develops not as an individual process, but through the process of social experience, where a person's perception of self develops from the reactions of others, and recognition from others further strengthens the perception the person has about his/her self-image (Grubb & Grathwohl, 1967). According to symbolic consumption theory, people use goods as symbols to communicate meanings about themselves to others with the anticipation of a desired response and improved interaction process (Grubb & Grathwohl, 1967). Thus, the person uses goods that have publicly recognized symbolic meanings to communicate those meanings and obtain a positive reaction from the audience. In this context, goods become social tools where the symbolic meanings of these goods become means of communication between the person and significant references (Grubb & Grathwohl, 1967).

It can be summarized that in a social context, people can use possessions as tools for communicating messages about themselves to make a certain impression and receive desired feedback from the audience. To be properly communicated, these possessions need to have shared symbolic meanings that can be understood by members of the audience. In case when possessions carry information about the owner, these possessions become means of self-extension, where through the symbolic meanings of possessions, the owner can express and enhance any of the selves that are salient for him/her at a certain moment. Additionally, similar to brands (Chernev et al., 2011), apart from messages about individual selves, possessions can communicate the group selves and be used to signal the current or desired belonging to certain groups

2.2. Key Research Concepts

To operate in the metaverse/social virtual worlds, users create a virtual version of themselves and represent themselves through avatars. These avatars can have characteristics of their owners, be fictional characters or creatures, or represent completely different persons. By using avatars, people explore the environment, engage in gaming, and interact with other users in the metaverse/social virtual worlds. In our research, we looked at the link between a user's connection with an avatar, or avatar identification, and virtual consumption, investigating the mechanism of how avatar identification impacts virtual consumption.

Avatar Identification

Despite the fact that through avatars users can represent themselves anonymously and play different personalities, in the majority of cases, the role of the avatar in the metaverse/social virtual worlds "is not anonymity and masquerade, but its opposite: self-representation" (Hamilton, 2009, p.4). According to Belk (2013) and Mäntymäki and Salo (2013), avatars in the metaverse/social virtual worlds can be treated as a form of self-extension, where users project a version of themselves through idealization, development, and manipulation of avatars. When users create avatars, these avatars can reflect the users' physical appearances, attitudes, or other elements of user identity (Van Ryn et al., 2018). At the same time, users can experiment with self-presentation and create avatars very different from their real selves (Van Ryn et al., 2018). As a result, through creating and manipulating avatars, users can choose the self-representation strategy by selecting identities, or selves, they want to extend or by creating new identities. However, since selves are organized in the hierarchical level in the minds of users, different selves have different levels of importance for users and, as a result, users develop different levels

of connection with avatars representing those selves. Additionally, the closer the avatar can represent the self of the user, the more the user associates the avatar with him/herself, and the stronger the connection between the user and his/her avatar. Therefore, the choice and design of avatars, or self-representation strategy, could impact the user-avatar connection, or avatar identification, depending on how well these avatars represent the salient selves of the user.

Avatar identification is “ the cognitive connection between an individual and an avatar, with the result being that the individual regards the avatar as a substitute self or has such an illusion” (Suh et al., 2011, p. 715). Higher levels of avatar identification play a crucial role in the user experience in the virtual worlds resulting in a more full and immersive experience (Poncin & Garnier, 2012), better social interactions (Vasalou et al., 2007), better communication (Takano & Taka, 2022), and higher motivation in the virtual worlds (Birk et al., 2016). Avatar identification can be considered as a construct having three subconstructs. According to Van Looy et al. (2012), avatar identification can be divided into similarity identification - user perception that the avatar resembles the real self, wishful identification - user perception that the avatar resembles the ideal self, and embodied presence - the degree to which the user perceives as if he/she is inside the avatar while using the virtual world platform. By having identification with avatars that have visual and behavioral features similar to the user, users can more easily create an identity for these avatars, resulting in stronger relationships with them (Kim et al., 2023) and more positive attitudes toward the avatar and platform (Suh et al., 2011). Apart from similarity identification and wishful identification, we followed Van Looy et al. (2012) approach and included in avatar identification the sub-construct of “Embodied Presence”, which relates to the feeling of presence, widely discussed in gaming

literature, and suggests that user's experience in the virtual world is impacted by the degree to which the user can feel present and experience the environment through the body of the avatar.

Virtual Consumption

One of the key activities in the metaverse/social virtual worlds is the consumption of virtual goods, such as clothing/accessories for avatars. Academic literature on virtual consumption suggests that the environmental characteristics of the metaverse/social virtual worlds can impact virtual consumption (Animesh et al., 2011; Cheon, 2013; Lee & Kim, 2022; Mäntymäki & Salo, 2013). As a result, environmental characteristics impact the intention to purchase virtual items through positive user experiences such as flow, social presence and telepresence (Animesh et al., 2011; Mäntymäki & Salo, 2013;), affective involvement and cognitive involvement (Huang, 2012), satisfaction (Cheon, 2013), and social connections and interactions (Zhang et al., 2017). Another branch of academic research focuses on the motivational factors of virtual consumption. Motivational factors include utilitarian, hedonic, and social factors (Mäntymäki & Salo, 2013); effort expectancy, performance expectancy, perceived enjoyment, and the customization of the character (Guo & Barnes, 2011); and users' perceptions of usefulness, enjoyment and network size (Mäntymäki & Salo, 2013). All these factors impact the virtual world adoption and predict the purchase intention in virtual worlds.

In our research, we looked at virtual consumption through the prism of self-extension and symbolic consumption theories described above. Due to the fact that consumption in the metaverse/social virtual worlds requires a social environment and the value of virtual items can be defined only by the symbolic value of the goods that is shared between users of the virtual environment (Martin, 2008), virtual

consumption can be viewed through the prism of symbolic consumption. Since symbolic consumption relies on impression management, where users pay attention to how their selves appear to others (Kang et al., 2023), it can also be linked to self-extension strategies, where virtual possessions help users enhance their avatars (means of self-extension) and represent their selves in the virtual world. By extending their selves through the avatars enhanced by possessions, users can form impressions about themselves (Belk, 1988), and possessions that have publicly recognized symbolic meanings become a medium of communication of people's self-images to reference groups (Wang & Chang, 2014). Thus, people use virtual items as a way to express their selves and the components of selves, such as status, individuality, interests, tastes, wealth, and knowledge, by displaying these virtual items to others. Therefore, we suggest that users in the metaverse/social virtual worlds purchase virtual items for their avatars to make an impression, communicate with others, and express their selves by exposing their virtual possessions.

In our research, through using qualitative and quantitative techniques, we explored different strategies of self-representation in the metaverse/social virtual worlds, suggesting that these strategies can impact the strength of avatar identification. Further, we demonstrated that the strength of avatar identification impacts virtual consumption and tested the mechanism through which it does so.

3. Empirical Research

To understand the mechanism through which avatar identification impacts virtual consumption (which was limited in our research to the consumption of virtual clothing/accessories for avatars), we conducted two studies and used a multimethod approach incorporating qualitative and quantitative analysis. Study 1, which was divided into Study 1a and Study 1b, included qualitative research consisting of in-

depth interviews with users of the metaverse/social virtual worlds. The aim of Study 1 was to collect insights about the users' self-representation strategies, user-avatar connections in those strategies, and users' motivations for purchasing behavior in the metaverse/social virtual worlds. The qualitative approach was needed due to the explorative nature of the study, where constructs, topics, and themes were not predefined but were generated from the insights collected during the study. Insights from Study 1, in addition to established constructs in academic literature, were used as a basis for hypotheses development in Study 2.

Study 2 consisted of a survey of users of the metaverse/social virtual worlds to collect quantitative data to support hypotheses about the links between avatar identification and virtual consumption. While Study 2 represented the main findings of our research, Study 1 not only helped to generate the hypotheses for Study 2 but also provided additional qualitative explanations and insights to support the findings of Study 2, which resulted in a deeper and more coherent understanding of the mechanism of how avatar identification impacts virtual consumption in the metaverse/social virtual worlds.

4. Study 1

To collect qualitative data and insights about user behavior in the metaverse/social virtual worlds, we chose to conduct in-depth interviews.

For participation in the interviews, the users had to be older than 18 years, use metaverse/social virtual worlds, and have experience of purchasing the virtual items at the metaverse/social virtual worlds within the last 6 months. Due to the specificity of the target population and the difficulties of finding participants, snowball sampling was used. Following the snowball sampling standards, we have approached the initial contacts through personal contacts as well as through platforms such as

Facebook and Reddit. After conducting the interviews with initial contacts, we asked the participants to refer our study to their friends.

All the interviews were conducted by the 1st author from November 2023 to February 2024. The interviews were held on the Microsoft Teams platform, and at the end of the interviews, the participants were paid 8 EUR in Amazon vouchers for their participation. The interviews lasted around 1-hour and were transcribed. Semi-structured in-depth interviews with the use of projective and laddering interview techniques were used (the approximate questions used in the interviews can be found in Appendix 1). The research followed all the ethical standards for collecting and storing the data. The names and other identifying information of participants were changed. A total of 30 interviews were conducted (see Appendix 2 for information about the participants) and used for analysis. Study 1a and Study 1b are parts of Study 1, consisting of a subset of questions analyzing a specific topic.

4.1. Study 1a. Self-representation and Avatar Identification

As was discussed earlier, avatar identification can be a result of self-representation strategies that the user selects where using avatars that have a better representation of the user selves results in stronger user-avatar connection, or avatar identification. The first goal of Study 1 was to collect insights about the users' self-representation strategies in the current metaverse/social virtual worlds and get a clearer understanding of the possible connection between self-representation strategies and user-avatar connection, or avatar identification.

4.1.1. Method

Study 1a was a part of Study 1 (see the participants' recruiting procedures) with a subset of questions aiming to reveal the possible reasons why users develop various levels of connection with their avatars, including studying the impact of self-

representations strategies on the connection with the avatar. Semi-structured interviews with the help of projective techniques were used to identify the self-representation strategies in the metaverse/social virtual worlds used by participants. The participants were asked to describe their personality in the physical world, their avatar/s in their favorite metaverse/social virtual world and compare their real personality with avatar/s on the basis of physical look, personality, and choices/behavior.

4.1.2. Analysis and Results

Self-representation Strategies

The findings of the interviews supported the main representation strategies of the real-self, better-self, and the other-self discussed in academic literature before. However, we also outlined one more type of representation strategy (“Fantasy-self”) based on the results of interviews. Thus, the findings of the interviews identified three main representation strategies: 1) Real/better-self 2) Other-self 3) Fantasy-self.

Strategy 1: The real/better-self representation

We merged the real and better-self strategies into one strategy because even if users created avatars as a better version of themselves, they still identified themselves with these avatars very strongly and perceived these avatars as part of themselves. Most interviewees (19 out of 30) had at least one avatar that represented their real/better self. In the majority of cases, it was the first avatar created that users kept using. This avatar had the same gender, race, and similar physical, personality, and behavioral features. However, even if some interviewees had avatars as exact copies of their real selves, most respondents tried to be represented by a better version of self by modification of some of the physical, personality, or choice characteristics.

In terms of physical characteristics, the interviewees wanted their avatars to look more attractive than they are in real life. Some interviewees, while keeping their personality and behavioral characteristics the same, changed the physical look of the avatars drastically.

Kenneth: "I don't want to make an avatar that looks like me. Why? Because I'm old and ugly".

However, in the majority of cases, the users altered just a few characteristics, while keeping the main physical characteristics that identify their real selves, such as gender or main physical features, the same. In many cases, the male interviewees tried to make their avatars look more masculine, stronger, and sportier. The female interviewees tried to make their avatars look cuter, brighter, and leaner, with different hair colors and styles. While keeping race the same, some respondents also slightly altered some physical characteristics of the race.

Ron: "I guess the skin tone is not as similar as mine. I guess it's a bit lighter. And also, it's a bit lean as compared to me in terms of the size".

Jen: "My avatar wears outfits that I may not wear in real space because I don't have the confidence in my physical body to wear some of those outfits really, really cute dresses, you know".

Apart from physical features, many respondents preferred to enhance their personality, making their avatars to be more confident, outgoing, and social. Through avatars, the respondents overcame the obstacles that they had in real life, such as a lack of confidence or being an introvert.

Brenda: "I think I'm way more confident in the game than I am in real life. I'm myself and I'm in a social contest online, but I'm alone in my house offline. So, I think that

gives me a distance to process things and also be, you know, more confident, more social online”.

Daniel: ”I can act more freely online. I can like talk to more people, talk more and have fun more and just have a good time with it”.

It is worth mentioning that even if virtual life provided a space with fewer borders, many respondents decided to keep, but just slightly exaggerate their personality characteristics.

Neal:” Let's say I'm social in real life, but I'm sort of like, introverted social. I meet people, then I may be comfortable to talk. That's when I interact with them. But my avatar, I guess, it's sort of like really branches out. And he is like, really vocal. It is similar, but over the borders compared to me”.

Tom: “Yeah, for the personality my avatar is the same, but I guess it's kind of over the edge in some way. It is extreme. It has the same personalities as me, but on an extreme end”.

Apart from projecting the better-self physical and personality characteristics, the avatars made choices or had possessions that their owners could not have in real life due to several constraints. Some of the constraints in real life included financial constraints. For example, through the avatars, the users could afford to have things in virtual life that they could not buy in real life, such as cars, property, or luxurious brands.

Steve: “In terms of clothing, I'd say there are some clothes that the avatar has that I don't normally wear in real life, yeah. In real life, I like wearing Adidas and Nike. But for my avatar, that's Balenciaga and Luis Vuitton”.

Apart from financial constraints, virtual life provided users with the space to overcome some judgmental constraints that exist in real life. In virtual life, the users could wear clothes that are more creative, bold, extreme, vibrant, or have features that could be considered inappropriate in real life.

Lara: "The colors of the appearance are very vibrant. Features that I cannot have in real life due to judging. There's lots of judging in real life".

Additionally, in virtual life, by attending virtual events, the users could have more opportunities to dress differently. Many respondents in real life purchased clothing that satisfies only their functional needs, so in virtual life, they could have opportunities to satisfy their emotional needs and dress up for the Gala Dinner, Halloween party, or other fancy events that they could not attend in real life.

Kenneth:" In real life, I work from home, so I don't need office wear. I never go anywhere fancy, so I don't need formal wear. I never buy anything expensive in real life, always the cheapest I can find. I don't like sportswear, so I don't buy branded things. In virtual life, I buy clothes to fit the environment, to fit dress codes, to match the place I'm at. When I go to a jazz club, my avatar will wear a suit for that. And for just hanging around or going sailing - just jeans and a T-shirt. Fantasy or unusual clothing is for fantasy parties that we have every Saturday".

Strategy 2: The other-self representation

According to the findings, some respondents created or chose avatars that were completely different from themselves in real life. However, only 5 out of 30 respondents had the other-self avatars as the main representation of themselves in the metaverse/social virtual worlds, while the majority of the respondents had the other-self avatars as additional avatars to their real/better-self avatars. Respondents who had the other-self strategy as the main strategy, did so intentionally, either

because they specifically did not want to identify their avatars with real selves, or just wanted to try other personalities.

Adam: "For me, it's not a way to identify myself in the game but is a kind of feeling of fun when you change personalities when you can be other people, other persons".

Liam: "I want to experience what it is like to be different".

Strategy 3: The fantasy-self representation

A very different type of representation happened if the metaverse/social virtual world was the fantasy gaming world, where the user had to choose the characters to play. In these worlds, users became the characters they chose, so role-playing came into play.

In some cases, while doing role-playing, the users' choice of characters somehow reflected their real personalities and preferences.

Denis: "I choose a creature that is more like me. I would never pick something aggressive. I like something more the smart creatures. So, I choose something that matches somehow me, my style, how I play".

Ben: "They are differed by professionals in the game. In real life, I tend to be friendly, so most of the time I would choose the "helper" character because I don't want to be like, you know, like the focus of the team. And I also do not want to be like the most offensive character in the team, so I would most of the time choose the helper".

In other cases, users chose characters that have completely different personalities from the personality of the user.

Benedict: "There are different classes and different races in the game. So based on the class and the race, usually you feel a little bit different while playing. Maybe the character is a part of me that I can't be in real life, and I won't. But I can try it in a

game. I'm a gentle person in real life and maybe in the game, on the other side, I'm like the evil part. I like to explore different paths to see how it would be if I did this one thing in a different way from how I did it, maybe in my life. I'm curious. So, for the reason that I love to try different things and explore different ways, I always created all the classes in the game just to learn how all different classes work differently”.

In other words, the fantasy-self strategy is something in-between the real/better-self and other-self strategies, where, even if the user was performing role-playing, he/she still had a choice whether to choose the characters that have some user's personality characteristics, such as preferences, interests, knowledge, or to choose characters with no projection of personality features.

Self-representation strategies and user-avatar connection

To operate in the metaverse/social virtual worlds, users can choose to represent themselves using one or multiple avatars. According to the findings, out of 30 interviewees, 12 respondents had only 1 avatar in the metaverse/social virtual worlds, while 18 respondents had more than one representation of themselves. For users with several avatars, typically, users' first avatars were closely aligned with their real-life personalities. However, as users became more comfortable, many began experimenting with their avatars, creating versions that diverged from their real selves, and adopting other-self strategies.

For users with multiple avatars, it was observed that their real/better-self avatars were the ones they used most often and for which they made the most virtual purchases. This suggests that the level of connection users develop with their avatars, or avatar identification, varies depending on the self-representation strategy they adopt, with stronger avatar identification being positively linked to the extent of self-projection through the avatar. As a result, it could be suggested that users

choosing the real/better-self representation strategy develop stronger connections with their avatars.

The choice and extent of the user's representation strategy depends on both personal motivations and the specific characteristics of the virtual platform. When users adopted the real/better-self strategy, their primary goal was to project an avatar that extended their selves in the virtual space. On the other hand, users who used the other-self strategy, often did so for the search of enjoyment, novelty, and entertainment. These users created avatars that diverged from their real personalities, often for purposes like role-playing, exploring new identities, or simply having fun with friends. For these users, the enjoyment came from the act of experimenting with different personas or from the reactions and interactions these alternate selves provoke in social settings.

Adam: "It is a feeling of fun when you change personalities, when you can be other people, other persons. Especially when there are me and my friends".

In addition to user motivations, the characteristics of virtual worlds also influence the choice between real/better-self and other-self representation strategies. For instance, in non-fantasy metaverse worlds that closely resemble the physical world and where users can create their avatars as they wish, most users created avatars similar to themselves. Among 21 non-fantasy metaverse world users, only 2 preferred the other-self strategy as their primary representation. Conversely, in fantasy metaverse worlds, users showed a greater preference for creating avatars that had fewer similarities with their real identities.

Brenda: "When I play games with realistic characters, I tend to build avatars with characteristics that I have myself. So, for example, I go with the heavier bodies, the grey hair, something like that I have. If the game has fantasy avatars, I don't think

about myself a lot at all, and I go for more either aesthetic view or I build them according to what my gaming style”.

As a result, the strength of the user-avatar connection, or avatar identification, appears to be significantly influenced by multiple factors, including the user's choice of self-representation strategy, their motivations, and the specific characteristics of the metaverse or social virtual world platform. Users who adopt a real or better-self strategy—where avatars resemble their real-world identities—tend to form stronger connections with their avatars, as this strategy allows for a greater degree of self-projection. In contrast, the other-self strategy, which often involves avatars that diverge from users' real identities, may foster weaker identification, primarily focused on fun, entertainment, or social experimentation.

Furthermore, the nature of the virtual world plays a critical role. In more realistic metaverse environments that allow for highly customizable avatars, users tend to replicate their real-world appearance, enhancing the identification process.

Conversely, fantasy worlds, where the avatars are often pre-defined and less tied to reality, tend to encourage a different form of interaction, where identification is more fluid and less about self-representation.

4.1.3. Discussion

According to Study 1a results, users in the metaverse/social virtual worlds had three main strategies to represent themselves: real/better-self, other-self, and fantasy-self.

While the real, better, and other-self strategies were discussed in the literature before, we classified fantasy-self as a separate strategy due to its distinct characteristic of role-playing. According to the findings, the majority of users had their main avatars representing their real/better-selves. This aligns with previous research, which suggests that users tend to reflect their ideal selves in avatars while

retaining their core identity elements (Takano & Taka, 2022). Participants who used other-self avatars did so mainly for fun and entertainment while keeping the real/better-self avatars as their primary ones. The fantasy-self strategy could be seen as something in between real/better-self and other-self strategies, where users could choose the extent to which the fantasy character projects the real personality characteristics of the user. Interestingly, while all three strategies were focused on making an impression, they employed different means to achieve that goal. While all three strategies had elements of making an impression through visual characteristics and fun elements, the real/better-self strategy had a stronger focus on expressing the user identity characteristics, such as resemblance in appearance and personality traits from the physical world.

Additionally, it was noticed that users develop stronger connections with their avatars when using a real/better-self representation strategy. It was discussed in the previous literature that higher avatar realism (an extent to which an avatar represents a real person) positively impacts the user-avatar identification and intention to use the avatar (Kim et al., 2023). However, in our study, we observed that people use more frequently and make more purchases for avatars that have a closer look not to any real person, but the user themselves.

While the choice of self-representation strategy could be influenced by user motivations, where users choose the extent to which the avatar resembles its owner, it could also be affected by the design characteristics of the metaverse/social virtual world. For example, in fantasy metaverse/social virtual worlds, users could only select characters instead of creating avatars, limiting the extent to which users can represent their selves through avatars. Additionally, non-fantasy metaverse/social virtual worlds also vary in the degree to which users can create avatars similar to

their selves, with some virtual worlds such as Meta Horizons, Decentraland, and Second Life offering the opportunity to create very realistic avatars, while others providing a limited range of available avatar features. Therefore, it could be suggested that in non-fantasy metaverse worlds, users have more opportunities to create more realistic avatars, use real/better-self representation strategies, and develop higher levels of user-avatar connection. Additionally, it could be suggested that as more and better tools are available on the metaverse/social virtual worlds to create avatars that help users represent their selves, a higher will be the connection of the user with his/her avatar, or avatar identification.

As a result of analyzing insights from Study 1a, we can conclude that user-avatar identification is a multifaceted process influenced by self-representation strategies personal motivations, and the design affordances of the virtual worlds. Users who adopt real/better-self strategies in highly customizable environments are more likely to develop a strong connection with their avatars, enhancing their virtual experience and potentially increasing virtual consumption.

4.2. Study 1b. Motivations Behind Virtual Consumption

To identify and test in Study 2 the mechanism through which avatar identification could impact virtual consumption, the second goal of Study 1 was to collect insights about the users' motivations for virtual consumption.

4.2.1. Method

Study 1b was a part of Study 1 (see the participants' recruiting procedures) with a subset of questions aiming to reveal users' motivations behind virtual consumption.

To identify the central motivational goals of virtual consumption, we used a goal hierarchy approach. The central concept of this approach is the notion that a goal, as a desired outcome of an action, exists within a hierarchal system and is located

between its superordinate and subordinate goals (Bandura, 1986; Jung & Pawlowski, 2014). Therefore, the attributes of objects represent the means by which people achieve benefits and important personal values (Jung & Pawlowski, 2014).

To understand the sequences of the goals and how goals are connected to each other, the means-end chain analysis (MECA) has been used. MECA is a type of analysis used by researchers to understand the way in which respondents perceive the world. It usually consists of laddering interviews to collect the data, performing content analysis to categorize the data into topics, and drawing a hierarchical goal map to generate a hierarchical structure and present the results (Jung & Pawlowski, 2014). According to traditional MECA, people's sense-making about a product is organized into three levels of abstraction: attributes, consequences, and values (Gutman, 1982). The attributes represent the observable characteristics, the consequences refer to psychological benefits, while the values refer to the abstract motivations of a certain behavior (Gutman, 1982; Jung & Pawlowski, 2014).

To perform MECA and to understand the motivations behind virtual consumption and the levels of the abstraction of the concepts, we used the laddering interview technique by asking three questions: the attribute question, the consequence, and the value questions:

- 1) When you purchase virtual items, what feature makes virtual goods to be attractive to you?
- 2) Why is this feature desirable to you?
- 3) Why is that important to you?

If after question 2 the respondents were not able to give a further answer or the value level was already reached (especially for the "save time/money/effort" value), the laddering process was completed.

To present goals in the hierarchical map, instead of using the traditional MECA approach and representing data in three strict levels of abstractness (attribute, consequence, and value), we followed the network theory MECA approach used by Jung and Pawlowski (2014). According to this approach, the abstractness level of each element can be computed to determine the position of the element in the hierarchical map. We used this approach for three reasons. First, our research had an explorative type, where the topics were not predefined. Second, the respondents had difficulties in some cases differentiating between consequences and values. Third, due to the situation when in some cases, during the coding process, the topics were duplicated because consequences and values represented different sides of the same topic. Due to all these particularities, the alternative network theory MECA approach was more feasible to use.

4.2.2. Analysis

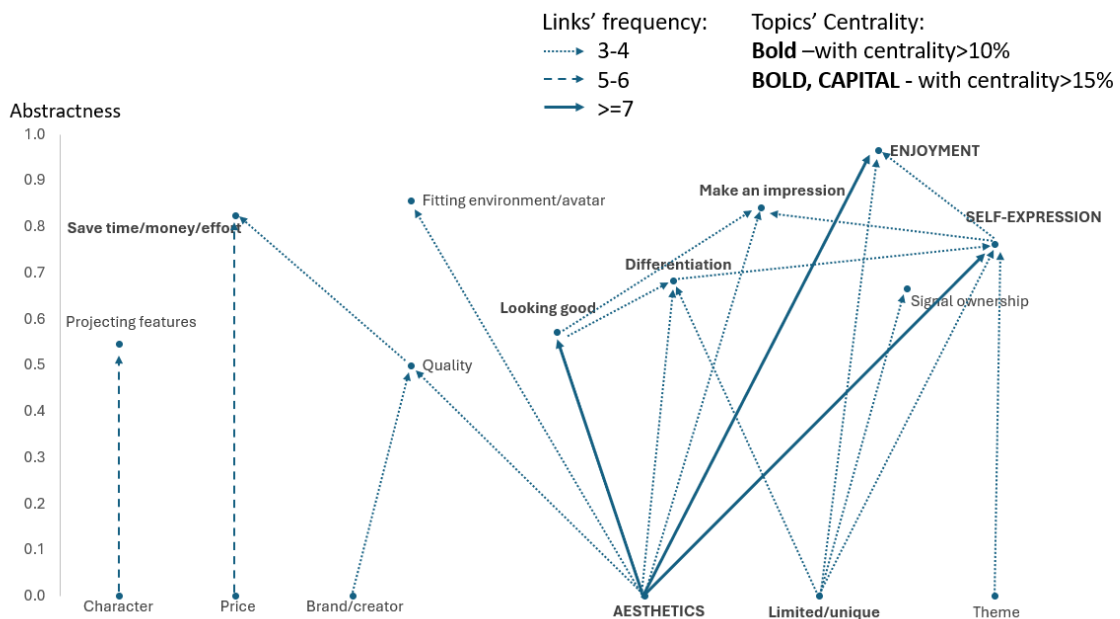
To perform MECA and develop a hierarchical structure, the data were analyzed on how many times each topic from each question was used as a means and as an end. After collecting the data from the interviews, content analysis was performed to categorize the text into topics. The first author performed coding using an open procedure, where the codes, or topics were not predetermined. The codes were applied to the attributes, consequences, and beliefs. A second coder (a research assistant, obtaining his PhD in Management studies) recoded the data using the set of codes and topics identified by the first coder. The codes of two raters were compared and reached an inter-coder agreement of 84% (coders agreed on 184 of the 219 codes), which indicates an acceptable level of inter-coder reliability (Lombard et al., 2002; Neundorf, 2002). Afterward, the intercoder disagreements

were discussed and settled resulting in a total of 219 codes grouped into 34 topics (see Appendix 3).

After generating the topics, these topics were organized in the goal hierarchy map. The map was organized by calculating the out-degrees (how many times the topic served as an origin of the linkages), and in-degrees (how many times the topic served as an end of linkages) to calculate the abstractness level (ratio of the in-degrees divided by the sum of in-degrees and out-degrees) and centrality of the topic (the ratio of the in-degree plus out-degree divided by the sum of all active cells). Elements with high abstractness were considered to be the ends of linkages, while elements with low abstractness were considered to be the sources. Elements with high centrality represented the most frequent elements and key topics on the map. To see the Implication matrix, refer to Appendix 4.

The hierarchical map is presented in Figure 1. To avoid complexity and enhance clarity, we applied the cut-off of 3 and included only the links mentioned at least 3 times. As a cutoff guideline, research suggests presenting linkages that correspond to more than two-thirds of all linkages in the implication matrix (Jung & Pawlowski, 2014). The selected cutoff of 3 including the links that are mentioned at least 3 times in our example represents 63% of all linkages (100 out of 158 links), so we decided to keep this level as an acceptable one.

Figure 1: Hierarchical Goal Map for Virtual Consumption



4.2.3. Results

The hierarchical goal map in Figure 1 demonstrates the most frequent topics organized in features and goals users seek in the process of virtual consumption and how these features and goals are related.

As was proposed before, the interviews revealed that one of the goals with high abstractness is the “Make an impression” goal.

Gregory: Like in a game, if my character looks better, it is a competitive edge for me. He puts psychological pressure on the team of the other side, that “OK, this guy has this, this specific skin, so he must be having attributes and skills to kill us... So, it gives psychological pressure to the opposite team”.

Neal: “I like something that is rare to find...really expensive or hard to find in some way. It makes it really valuable and impress my friends that I have something unique”.

Melissa: "Wearing this skin with a particular theme is a way to show that, I know the story behind it, which helps to get recognition and it's like being part of this very special society".

However, according to the map, the central goals of virtual consumption (according to centrality metrics) are "Self-expression" and "Enjoyment", which correspond to more than 40% of linkages in the implication matrix. While "Enjoyment" is regarded as the highest abstraction goal, the most central goal of the goal hierarchy is the "Self-expression" goal, which contributes to 24% of all linkages. Many product features are connected to "Self-expression" directly or indirectly through the subgoals. It is important to emphasize the interconnectedness of goals. As can be seen from the map, the central goal of virtual consumption "Self-expression" is connected to the higher abstractness goals of "Enjoyment" and "Make an Impression" and subgoals of "Differentiation" and "Looking good".

According to the map, the most common features in virtual products that the users are looking for are "Aesthetics" and "Limited/unique" products, measured by the centrality of the topics. These 2 topics contribute to 38% of all linkages in the map. "Aesthetics" is the main source of achieving higher-level goals with the strongest links of "Aesthetics" with "Looking Good", "Self-expression", and "Enjoyment".

Two features that stand separately are "Price" and "Character". This is not surprising. "Price" is not related neither to "Self-expression", "Make an impression", or "Enjoyment" because it creates a separate, stand-alone "Save time/money/effort" goal. Interestingly, even though virtual consumption does not bring any functional value in the physical world, it brings some functional value, such as saving time, money, or effort in the virtual world. "Character" impacts only the "Project features" goal and brings additional proposed insights, that users who choose a specific

character for the avatar (which should relate to low avatar identification) do not intend to express their selves through using the chosen character but use it for other purposes.

4.2.4. Discussion

If the ultimate goal of symbolic consumption is to make an impression on others through possessions that have symbolic meanings, it can be argued that possessions that bring self-expression and enjoyment (the central goals of virtual consumption revealed in Study 1b) can be used as a means to make an impression, which leads to increased virtual consumption. However, while the self-expression goal can be directly related to symbolic consumption (as shown by the links between “Self-expression” and “Make an impression” goals in the Hierarchy map), the enjoyment goal does not have a straightforward connection.

In our view, enjoyment can be divided into two parts: enjoyment for personal satisfaction and enjoyment as a symbol to make an impression. Due to the fact that consuming virtual items in the virtual world equals exposing those items, virtual items that bring enjoyment can also make an impression about the item holder. Through virtual items that bring enjoyment, the user can express his/her tastes and make the avatar look fun/beautiful/ entertaining to make an impression on others, which can also result in mutual enjoyment and entertainment.

Thus, we consider both self-expression and enjoyment as a means of symbolic consumption and the main motivators for the intention to purchase virtual items.

Furthermore, we use self-expression and enjoyment obtained by the use of virtual clothing/accessories as a mechanism through which avatar identification impacts the intention to purchase virtual clothing/accessories, a mechanism we intend to test in Study 2.

5. Study 2

5.1. Hypothesis Development

As was previously proposed, virtual consumption can be viewed through the prism of self-extension through symbolic consumption, where virtual items are purchased and exposed to make an impression on other members of the virtual community.

Through avatars, users represent a certain user identity, or self, and purchase virtual items for these avatars to enhance and emphasize these selves. At the same time, according to Arnett et al. (2003), to affect a person's behavior, expressing identity, or self, needs to become important to the person, and salient selves are more likely to affect behavior than those that are less salient. Making an impression in the metaverse/social virtual world becomes important to the user when the user appreciates the network of other members of the virtual community in the metaverse/social virtual worlds. In this context, representing him/herself, through an avatar to make an impression on others becomes important to the user, where using avatars that can better represent salient selves results in a stronger user-avatar connection, or avatar identification. When a virtual self, represented through an avatar, reaches a certain level of salience, users are willing to perform identity-related behaviors. In our case, when the identification with any specific avatar increases, users are willing to invest in this avatar and purchase virtual items to enhance this self, represented through the avatar. Thus, we suggest that avatar identification has a positive impact on virtual consumption.

As suggested by the results of Study 1b, there are two central motivational goals linked to virtual consumption: self-expression and enjoyment. Therefore, we propose that virtual clothing/accessories providing self-expression or enjoyment help users enhance their selves and make an impression, resulting in virtual consumption of those items.

Self-expression through virtual items can be achieved by using clothing/accessories for avatars that represent the social status, achievements, self-image, personal values, and tastes of the user. Simultaneously, with virtual clothing/accessories, the user can send a message about the social groups he/she belongs to or wants to belong to. We propose that self-expression through virtual clothing/accessories is one of the mechanisms that help users make an impression and send a message about their selves. Therefore, we propose that with higher avatar identification, users are more motivated to make an impression on others through the use of clothing/accessories that provide self-expression.

H1: Avatar identification is positively related to self-expression through virtual clothing/accessories

As discussed earlier, apart from the items that bring self-expression, purchasing and exposing virtual items that bring enjoyment to the user can be treated as a means of impression management as well. Fun, entertaining, and beautiful elements that bring enjoyment can make a positive impression about the user and be used as a communication tool between the user and the audience. Moreover, virtual items can be appreciated by the reference audience both for their aesthetics and for the fact why their owner has chosen them (Martin, 2008). Therefore, we propose that with higher avatar identification, users are motivated to make an impression through the clothing/accessories that bring enjoyment.

H2: Avatar identification is positively related to Perceived enjoyment through virtual clothing/accessories

As proposed before, self-expression and enjoyment are the key goals of virtual consumption. Additionally, we expect that these two goals are correlated with each other. There is a strong link between social and emotional values of the virtual goods

for the users (Lehdonvirta, 2009), as well as between aesthetics and social image expression (Kim et al., 2011), which are represented by self-expression and enjoyment constructs in our study. Additionally, as we can see from the results of Study 1, the goal of “Self-expression” has links with “Enjoyment” and “Looking good” goals.

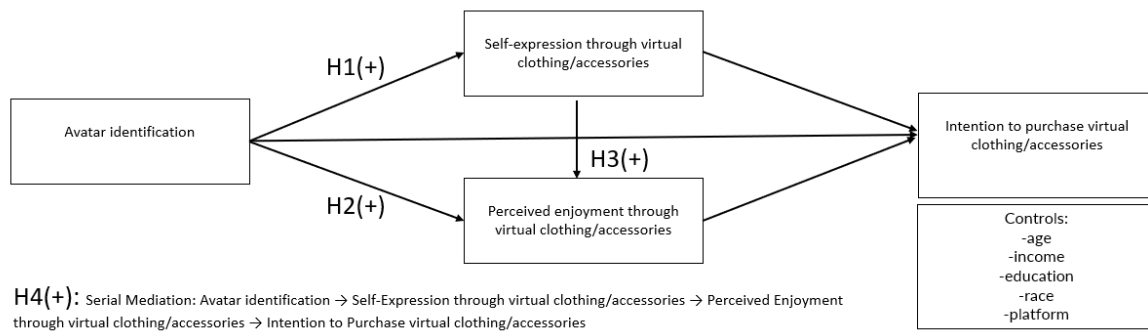
H3: Self-expression through virtual clothing/accessories is positively related to Perceived enjoyment from virtual clothing/accessories

Since “Avatar identification” is correlated with “Self-expression through virtual clothing/accessories” and “Perceived enjoyment through virtual clothing/accessories”, and since “Self-expression through virtual clothing” and “Perceived enjoyment through virtual clothing/accessories” are correlated, we expect that “Avatar identification” will impact the “Intention to Purchase virtual clothing/accessories” via serial mediation through “Self-expression through virtual clothing/accessories” and “Perceived enjoyment through virtual clothing/accessories”.

H4: Avatar identification is positively related to the Intention to purchase virtual clothing/accessories via serial mediation through Self-expression and Perceived enjoyment through virtual clothing/accessories

The conceptual model of Study 2 is presented in Figure 2.

Figure 2: Study 2 Conceptual Model



5.2. Method

The goal of our study was to understand the impact of “Avatar identification” on the “Intention to purchase virtual clothing/accessories”.

The study participants were recruited on the Prolific platform and completed the study in exchange for a small payment. The data collection and data storage fulfilled ethical standards and privacy requirements. To conduct the Study, first we needed to prescreen the participants who used/purchased virtual items for their avatars (only for decorating purposes) on the metaverse/social virtual world platforms in the last 6 months. The pre-screening procedure questions were sent only to participants in the US, UK, and Canada who identified themselves as online gamers. 800 participants were asked if they have used Decentraland, Roblox, Fortnite, Sandbox, Second Life, Minecraft, Animal Crossing, Unity, Omniverse, Horizon Worlds, or other metaverse/social virtual world platforms and if they had used or purchased virtual items for their avatars (only for decorating purposes) on those platforms in the last 6 months. As an outcome of pre-screening procedure, out of 800 responses, 300 participants (who had used/purchased virtual items on the mentioned platforms in the past) were selected and to whom the invitations to take part in the survey were sent.

As a result, we collected responses from 300 participants and used responses from 291 participants who passed through additional screening questions (were 18 years old, used/purchased virtual items on metaverse platforms, and passed the attention check questions). Participants were asked to choose their favorite metaverse/social virtual world platform and evaluate their experiences on that platform. The descriptive statistics of the respondents can be found in Appendix 5.

5.3. Construct Measurement and Measurement Model

Some construct variables such as “Avatar Identification” and “Intention to Purchase Virtual Clothing/Accessories” with corresponding questions were taken from previous literature and adapted to the context of purchasing behavior in the metaverse/social virtual worlds, while other constructs, such as “Perceived Enjoyment through Virtual Clothing/Accessories” and “Self-expression through Virtual Clothing/Accessories” were developed by authors. Description of constructs with questions employed can be found in Appendix 6.

We created a construct of “Perceived Enjoyment through Virtual Clothing/Accessories” as a subset of 4 questions: “The virtual items that I own give me: 1) Fun 2) Entertainment 3) Aesthetical pleasure 4) Personal Enjoyment.” To create this construct, we adopted three questions (questions 1,2, and 4) from the “Enjoyment” construct of Mäntymäki and Salo (2013) with an additional question measuring the perceived aesthetical pleasure. The importance of aesthetical pleasure in the hedonic value obtained from the virtual items was discussed in the works of Kim et al. (2011), Lehdonvirta (2009), therefore, we have decided to include it as a sub-element of the “Enjoyment” construct.

We created a construct of “Self-expression through Virtual Clothing/Accessories” as a subset of 4 questions: “The virtual clothes/accessories that I own help me to

express 1) my Self-image of who I am or who I want to be 2) my Achievements and Social Status of who I am or who I want to be 3) my Individuality, Tastes, and Personal values of who I am or who I want to be 4) the Social Groups to which I already belong, or want to belong.” The self-expressive function of possessions through demonstrating self-image, social status, and social memberships (questions 1, 2, and 4) is related to the notion of conspicuous consumption and it was widely discussed in the previous literature before (Chernev et al., 2011). Additionally, as was discussed in the recent literature on virtual consumption, users in the virtual worlds want their avatars to look distinctive and they use virtual possessions to communicate also personal information to others about who they are and who they want to be (Lehdonvirta, 2009; Martin, 2008), therefore, we included the sub-measure of individuality, tastes, and personal values (question 3) in the construct of “Self-expression through virtual clothing/accessories”

As an independent variable, we have included the variable of “Avatar identification” (nine questions measured on a 7-point Likert scale). The dependent variable was “Intention to purchase virtual clothing/accessories” (three questions measured on a 7-point Likert scale), and two Mediator variables were “Self-expression through virtual clothing/accessories” and “Perceived enjoyment through virtual clothing/accessories” (both measured with four question measure on a 7-point Likert Scale). Additional explorative variables that we included were “Self-expression through physical clothing/accessories” (four questions measured on a 7-point Likert scale) and “Functional consumption in the physical world” (measured on a 0-10 scale, where 0 was Emotional/Social Consumption, while 10 was Functional Consumption). Control Variables included Demographic characteristics and the platform used. All the variables’ constructs can be found in Appendix 6.

The data were analyzed using structured equation modeling using Stata software. We started the analysis by checking the convergent and discriminant validity of the model. Convergent validity shows the degree to which items of latent variables that are theoretically related, are related in reality, while discriminant validity shows if the items measure the construct in question or other constructs (Mäntymäki & Salo, 2011). Convergent validity was evaluated based on 3 criteria: Cronbach alpha should exceed 0.7, composite reliabilities (DG and Composite reliability rho_A in case of this analysis) should exceed 0.8, while the average variance extracted of each construct (AVE) should be greater than the variance due to measurement error and exceed 0.5 (Fornell & Larcker, 1981; Mäntymäki & Salo, 2011). To evaluate discriminant validity, we used the approach applied by Fornell and Larcker (1981) which claims that the discriminant validity is met if the square root of the AVE for each construct exceeds the correlation between that and any other construct. The AVE from the construct should be higher than the variance shared between the construct and other variables in the model.

5.4. Analysis

After checking the validity and reliability of the measurement model, we proceeded to check the structural model. The model testing was conducted using the PLS-SEM model. Using SEM allows the testing of complex relationship patterns as a whole because it can explore several indicator variables per construct simultaneously rather than only one at a time (Cheon, 2013). The advantage of the component-based (PLS-SEM) compared to the co-variance-based structural model (CB-SEM) is that it is non-parametric, does not make restrictive assumptions about data distribution, and requires a smaller minimum sample size (Hamari, 2015). Additionally, in contrast to the co-variance-based SEM suited more for testing which

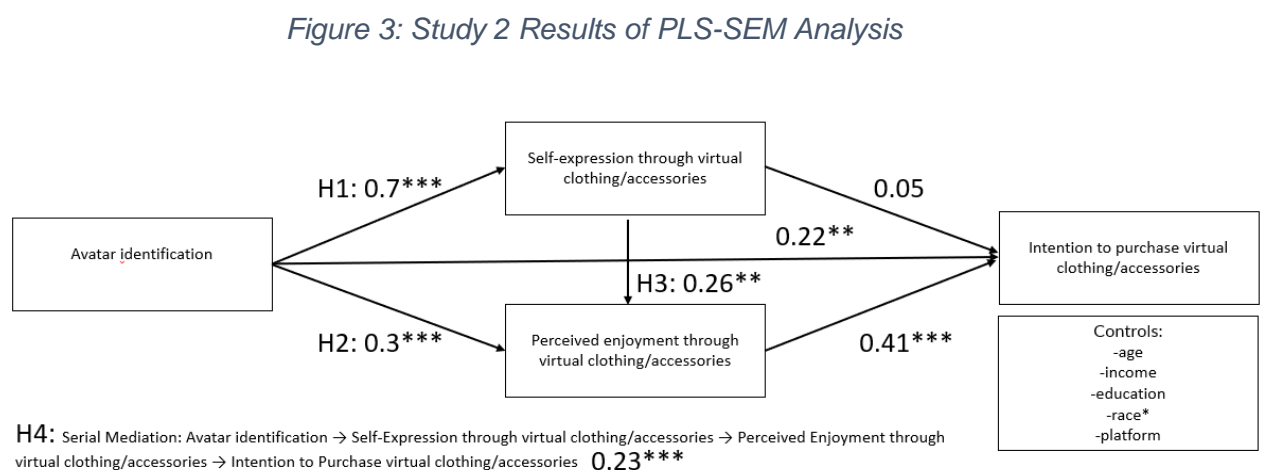
models better fit the data, PLS-SEM is focused more on prediction-oriented studies and provides more accurate measurement of path coefficients in the model (Hamari, 2015).

5.5. Results

As Appendix 7 and Appendix 8 show, the model reached both convergent and discriminant validity. Convergent validity was met because Cronbach alpha exceeded 0.7, composite reliabilities (DG and Composite reliability rho_A) exceeded 0.8, while the AVE of each construct exceeded 0.5. Discriminant validity was met because the square roots of each AVE value (indicated in bold) in Appendix 8 were greater than the off-diagonal elements, indicating discriminant validity. PLS-SEM was conducted with 5000 bootstrapping subsamples to estimate the significance of the path coefficients.

The R² of intention to purchase virtual items was 35%, which indicates that the model as a whole has good predictive validity.

The results of the structural model are presented in Figure 3.



* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

As expected, and as shown in the figure, “Avatar identification” impacts both “Self-expression through virtual clothing/accessories” and “Perceived enjoyment through virtual clothing/accessories”; therefore, H1 and H2 are supported.

Corresponding to the results of Study 1b where Self-Expression and Enjoyment were correlated and to results from other academic literature stating the connection between social and emotional goals (Kim et al., 2011; Lehdonvirta, 2009), the results of the SEM analysis also support the positive link between “Self-expression through virtual clothing/accessories” and “Perceived enjoyment through virtual clothing/accessories”; therefore, H3 is supported.

The results of the bootstrap analysis on the impact of “Avatar identification” on the “Intention to purchase virtual clothing/accessories” through serial mediation reveal that the indirect effect of the mediation is significant and contributes to 52% of the total effect. The split of the mediation paths is presented in Table 1.

Table 1: Mediation Analysis

Serial Mediation	Coef.	P-value	Share
<i>Direct effect (no mediation)</i> Avatar identification → Intention to purchase virtual clothing/accessories	0.22	0.007	48%
<i>Indirect effect of mediation1</i> Avatar identification → Self-expression through virtual clothing/accessories → Intention to purchase virtual clothing/accessories	0.04	0.50	8%
<i>Indirect effect of mediation2</i> Avatar identification → Self-expression through virtual clothing/accessories → Perceived enjoyment through virtual clothing/accessories → Intention to purchase virtual clothing/accessories	0.08	0.006	17%
<i>Indirect effect of mediation3</i> Avatar identification → Perceived enjoyment through virtual clothing/accessories → Intention to purchase virtual clothing/accessories	0.12	0.002	27%
<i>Cumulative Indirect effect</i> Indirect effect1+Indirect effect2+Indirect effect3	0.23	0.000	52%
<i>Total effect</i> Direct effect + Indirect effect1+Indirect effect2+Indirect effect3	0.45	0.000	100%

*Control variables are used in the analysis, but not included in the table

Just like Study 1 suggested, both Self-expression and Perceived enjoyment are key mechanisms through which Avatar identification impacts the Intention to purchase virtual clothing/accessories. As was suggested before, two constructs are highly correlated, and “Self-expression through virtual clothing/accessories” impacts virtual consumption by altering the “Perceived enjoyment through virtual clothing/accessories” construct. The cumulative indirect effect of these two mechanisms in the process of serial mediation is 52%.

As a result, all four hypotheses are supported, and a summary of the hypotheses can be found in Table 2.

Table 2: Study2 Summary of Hypotheses Tests

Hypothesis	Proposed direction of Impact	Path coefficient	p-Value	Support
H1: Avatar identification → Self-expression through virtual clothing/accessories	Positive	0.699	0.000	Yes
H2: Avatar identification → Perceived enjoyment through virtual clothing/accessories	Positive	0.297	0.000	Yes
H3: Self-expression through virtual clothing/accessories → Perceived enjoyment through virtual clothing/accessories	Positive	0.267	0.001	Yes
H4: Avatar identification → Self-expression through virtual clothing/accessories → Perceived enjoyment through virtual clothing/accessories → Intention to purchase through virtual clothing/accessories	Positive	0.232	0.000	Yes

5.6. Discussion

According to the findings of Study 2, avatar identification impacts the intention to purchase virtual clothing/accessories through alerting the feelings of self-expression and perceived enjoyment obtained from the use and exposure of those items.

However, as shown in Figure 3, the impact of “Avatar identification” has a stronger effect on “Self-expression through virtual clothing/accessories” than on “Perceived enjoyment through virtual clothing/accessories”. It can be explained by the proposition that all the users who have some connection with their avatars, or avatar identification, try to impress others in the virtual space with beautiful/fun/entertaining items. This is also supported by the analysis of qualitative data from Study 1a, where users of all three self-representation strategies, including fantasy-self and other-self strategies, where users did not identify themselves fully through avatars, were purchasing virtual items for enjoyment purposes. However, by merging the results from Study 1a and Study 2, we propose that the users who genuinely try to represent themselves through their avatars, for whom the avatars are the extensions of

themselves in the virtual space, and who therefore have very strong avatar identification, aim to send messages and impress others through items that provide self-expression. That is why avatar identification has a stronger impact on self-expression than on perceived enjoyment obtained from the virtual clothing/accessories.

Additionally, even though the indirect effect of the proposed serial mediation was statistically significant and contributed to 52% of the total effect, the direct effect of “Avatar identification” on the “Intention to purchase virtual clothing/accessories” remained significant. Therefore, we can conclude that the proposed mediation is statistically significant but still partial mediation. It could be suggested that there are additional explanations for the direct effect. For example, the intention to purchase virtual items can also be a result of a higher intention to use the metaverse platform in the future and, therefore, invest in virtual items. This and other explanations are not covered in this research and leave the prospect for future research.

6. Conclusions

6.1. General Discussion

This research investigated the impact of users’ avatar identification on the intention to purchase virtual clothing/accessories in the metaverse/social virtual worlds.

Insights from qualitative Study 1, consisting of 30 in-depth interviews, revealed three strategies of self-representation (real/better-self, other-self, and fantasy-self) in the metaverse/social virtual world that impact the strength of avatar identification.

Additionally, Study 1 revealed the virtual consumption goal hierarchy, where the central goals behind virtual consumption are obtaining self-expression and enjoyment, which correlated with each other and connected with other smaller goals.

Findings from Study 2, a survey of metaverse/social virtual world users,

demonstrated that higher avatar identification positively impacts the intention to purchase virtual clothing/accessories via serial mediation through alerting self-expression and perceived enjoyment obtained from the use of virtual clothing/accessories.

Through the lens of symbolic consumption and self-extension theories, we explained and clarified a possible mechanism of how avatar identification impacts the intention to purchase virtual clothing/accessories. According to our proposal, users purchase virtual clothing/accessories to make an impression on the audience in the metaverse/social virtual worlds and use features of virtual clothing/accessories that have common symbolic meanings to make this impression. These symbolic meanings are communicated either from self-expression or enjoyment obtained during the use and exposure of virtual clothing/accessories. Thus, the virtual items through which the user extends his/her selves in the metaverse/social virtual worlds work as symbolic means to make an impression and communicate either a message about the user identity (self-expression) or the emotional value of the item such as entertainment, beauty, and fun (enjoyment). Both means (self-expression and enjoyment), which are also correlated with each other, help the user to make an impression in the metaverse/social virtual worlds and induce virtual consumption. However, not all users in the metaverse/social virtual worlds seek to make an impression through self-expression or enjoyment obtained through virtual clothing/accessories. The results of our research revealed that to have a higher motivation to make an impression through the clothing/accessories that communicate self-expression or enjoyment, users need to build a psychological connection with their avatars, or user identification, obtained from the extent of how avatar's design characteristics resemble the users' selves.

6.2. Theoretical Contributions

Our research has several theoretical implications. First, this research is one of the first studies, to our knowledge, to investigate the impact of avatar identification on virtual consumption in the metaverse/social virtual worlds. Previous research investigated the links between avatar identification and user's positive behavior such as social interactions (Vasalou et al., 2007), communication (Takano & Taka, 2022), and motivations in the virtual world (Birk et al., 2016), but there was no substantial research testing the link between the avatar identification and virtual consumption. Since the impact of avatar identification on virtual consumption was not investigated in previous research, this gap left a significant aspect of virtual consumption unexplored. Our research filled this gap and provided support that avatar identification makes a positive impact on virtual consumption. Second, through the lens of symbolic consumption and self-extension theories, this research deepens the understanding of the mechanism through which avatar identification impacts virtual consumption. Our study demonstrates that to make an impression on the audience, users with higher avatar identification have a higher need to obtain the symbolic meanings from virtual items (means of self-extension) and communicate self-expression and enjoyment obtained from those items, which results in a higher intention to purchase virtual clothing/accessories. Third, this research has a considerable number of qualitative insights obtained from in-depth interviews, which help in obtaining a deeper understanding of the self-representation strategies in the current metaverse/social virtual worlds, the possible connection between self-representation strategies and avatar identification, and the hierarchical goal structure providing additional insights and explanations of the mechanism impacting the virtual consumption.

6.3. Practical Implications

This research also has several practical implications. First, since many companies enter metaverse/social virtual worlds, it is important for companies and marketers to understand how platform design characteristics might impact the commercial potential that comes from user spending on those platforms. According to the results of our research, avatar identification positively impacts the intention to purchase virtual items. Therefore, to increase users' spending on their platforms, metaverse/social virtual worlds need to provide more opportunities for users to create avatars that resemble users' physical or personality characteristics or represent users' selves. Avatars that closer represent the users' selves help users to create stronger connections with their avatars, or avatar identification, which in turn increases willingness to invest in those avatars and purchase virtual clothing/accessories. Second, by demonstrating the mechanism impacting virtual consumption, the research suggests that to induce virtual consumption, virtual clothing/accessories need to provide users of the metaverse/social virtual worlds with either an opportunity for self-expression or enjoyment, which can be obtained in the majority of cases through the features of the virtual clothing/accessories such as aesthetics and limited/unique goods. On one side, companies can enhance self-expression meanings by providing virtual items that have recognizable or self-expressive brands, messages about the values of the holder, messages about the tastes/preferences of the holder (music, celebrity, etc.), themes, certain group belongings (university, city, country, social groups), etc. On the other side, companies can enhance enjoyment meanings by providing items that are aesthetically beautiful, entertaining, and fun. Furthermore, the results show that while avatar identification has a positive correlation with both self-expression and enjoyment values, the impact of avatar identification is stronger on items with self-

expression values. Therefore, for companies that provide virtual items with self-expression messages (brands, for example), it is more important to choose metaverse/social virtual world platforms where users can create higher avatar identification. Additionally, since different platforms, due to design characteristics, provide different ways of self-representation strategies, where some platforms give an opportunity to create more realistic avatars and experience the worlds with the same avatar, while others provide an option to create avatars by selecting the pre-defined or fantasy characters, symbolic consumption in these two scenarios will be different. There will be more opportunities and more financial prospects for virtual clothing/accessories that enhance self-expression at the metaverse/social virtual world platforms where users can create very personalized avatars. On the other side, to be successful in the metaverse/social virtual worlds where users only select predefined avatars or characters, providers of virtual clothing/accessories need to make more focus on the products enhancing enjoyment rather than self-expression. These insights from the research can be utilized by companies, marketers, and platform providers to better design the product characteristics adjusted to the metaverse/social virtual world design characteristics and generate higher financial outcomes.

Finally, since current metaverses/social virtual worlds generate more opportunities for users to create more realistic avatars, followed by increased avatar identification, it may be suggested that users will spend more on the metaverse/social virtual world platforms in the future. This acts as an additional incentive for companies to enter the metaverses and highlights the importance of the insights from our research to be used in the platform and product design characteristics.

6.4. Post Analysis (Additional Insights). Links between Self-Expression and Consumption Habits in Virtual and Physical Worlds (See Appendix 9)

We performed an additional Post-Analysis from the intriguing insights that have emerged in Studies 1 and 2, which, we believe, can be used in future research.

According to the results of our research, in virtual worlds, users seek to make an impression on others and one mechanism to do so is through expressing themselves through virtual clothing/accessories. The intriguing question that may arise is “How self-expression in the virtual world might impact the self-expression and consumption patterns in the physical world?” To answer this question, additional insights from Study 1 and Study 2 were gathered.

According to the results of explorative research in Study 1, some users of virtual worlds tended to have more functional patterns of consumption in the physical world, while satisfying their emotional and social needs through the clothing/accessories in virtual life (See Appendix 8). Furthermore, by inserting two additional dependent variables “Self-expression through physical clothing/accessories” and “Functional consumption in the physical world” into the PLS-SEM equation of Study 2 (see Appendix 9), the positive links between “Self-expression through virtual clothing/accessories” and both “Self-expression through physical clothing/accessories” and “Functional consumption in physical life” were revealed. Thus, people who want to express themselves through clothing/accessories, have a desire to do so in both worlds. Nevertheless, even if self-expression in the virtual worlds has a positive correlation with self-expression in the physical world, the means of self-expression could be different due to boundaries, rules, and standards existing in these two worlds. In fact, higher self-expression in the virtual world is related to more functional (vs. emotional/social) consumption in the physical world,

suggesting that users who express themselves more in the virtual world seek to express themselves in the physical world as well, but through the less expressive means and more functional (vs. emotional/social) patterns of consumption.

The results of additional research, based on qualitative insights from Study 1 and quantitative survey data from Study 2, suggest that since metaverse/social virtual worlds give an opportunity to users express themselves in the virtual world, people who perform higher self-expression in metaverse/social virtual worlds could have a lower need to purchase emotional/social goods, substituting them with functional goods in the physical world.

Therefore, insights from main and additional research suggest that self-expression in the metaverse/social virtual worlds can make an impact in both virtual and physical worlds. Higher self-expression through virtual clothing/accessories increases the intention to purchase those items in virtual worlds while also resulting in more functional (vs. emotional/social) consumption in the physical world.

6.5. Limitations and Future Research

According to our research, avatar identification positively impacts the intention to purchase virtual clothing/accessories via serial mediation through self-expression and perceived enjoyment obtained through the virtual items. However, even if the impact of the proposed mediation is significant and corresponds to 52% of the total impact, the direct impact of avatar identification on the intention to purchase virtual items is also significant. This suggests that there are additional links, apart from motives of self-expression and enjoyment, explaining the impact of avatar identification on the intention to purchase virtual items. Thus, to better understand the role of avatar identification in the virtual consumption topic, additional research is needed.

Also, while our research combines qualitative insights from interviews and quantitative survey data about users' attitudes, perceptions, and intentions, the research from observational data, such as transactional data obtained from actual metaverse websites and links of those data to users' avatars, could benefit the academic research on the topic of avatar identification.

Nevertheless, our research is one of the first steps in understanding the link between avatar identification and virtual consumption and we hope it will provide valuable insights for the industry players as well as inspiration for further academic research.

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APPENDICES

Appendix 1: Study 1 In-depth Interview Questions

1. Ice breaking session/Gaming behavior

- Tell me about yourself. How old are you? What is your current occupation?
- When have you started to use metaverse/virtual worlds?
- How often do you use metaverse/virtual worlds?
- What are your favorite metaverse/virtual worlds?
- Could you please briefly describe the scenario/type of metaverse/virtual worlds? How do you use them/what do you do there?
- Do you use VR glasses to use metaverse/virtual worlds?
- What are the main purposes of using metaverse/virtual worlds for you?

2. Similarity with Avatar

- How would you describe your avatar (adjectives)? How would you describe yourself (adjectives)? - **projective technique**
- Could you please describe the avatar that you have in your most used metaverse/virtual worlds in terms of look and personality. Do avatars differ significantly from world to world? How many of them do you have per world?
- Is the most used avatar similar to your real look, style, and personality? Why and why not?
- Does the behavior of your most used avatar similar to your real behavior? Why and why not?
- Does your most used avatar have the same preferences as the real you?

3. Virtual Purchasing Behavior

- Please complete the sentences - **projective technique**:
 - People who purchase virtual goods usually are...
 - People purchase virtual goods in order to...
 - My friends think that purchasing virtual goods is...
 - ...prevents people from purchasing virtual goods (Elaborate on this)
- How much on average per month do you spend on purchasing goods (virtual clothing/skins for your avatar)?
- What was the most expensive item that you have purchased?
- What is the average price that you pay for virtual goods?
- What, in your opinion, determine the price of a virtual good?
- Could you please describe the last virtual good you purchased?
- What feature makes the virtual good attractive to you? Why that feature important or desirable to you/What does this feature help to achieve? What is the underlying value/reason/ Why is that (the subject's response) important to you? - **projective laddering technique**
- How would you describe your purchasing behavior in virtual worlds (features of products, reasons for purchasing)? How it is different from purchasing in physical world?
- How important is it to customize the virtual good that you purchase? Why is it important or desirable to you/What does this feature help to achieve? What is the underlying value/reason/ Why is that (the subject's response) important to

you? - projective laddering technique

Attitude towards brands' strategies

- For the brands that you have listed, how would you describe them (adjectives)? Physical brand, Virtual brands, Both. - **projective technique**
- How important for the good that you purchase in virtual world to be a branded product? Why brands are important or desirable to you/What does it help you to achieve? What is the underlying value/reason/ Why is that (the subject's response) important to you? - **projective laddering technique**
- Have you purchased any branded virtual goods? Please, share your experience. What was the brand that you purchased? Is it a virtual brand or it also exist offline?

If no offline brand purchase

- If your favorite physical brand would enter the virtual world, would you be interested in buying items of that brand in virtual world? Please, reflect on why or why not?

If offline brand purchase:

- Have you purchased the items of this brand in the physical world?
- What were the main reasons why you have purchased the physical brand virtually? Elaborate on this.
- Did the look of purchased virtual goods of this brand was similar/different from the one available in physical world?
- Did you purchase branded items that are available only virtually, or there were any bundles, concessions, or anything else, provided by the brand in the physical world? How useful was this? Elaborate on this.
- Did the purchasing of virtual goods affected somehow your attitude towards the brand or your consumption/experience with the brand in the physical world?

4. Attitude towards NFTs

- Have you purchased any NFTs for your avatar? How much did you pay for those NFTs? Elaborate on this.
- Attitude
 - What do you think about NFTs?
 - How having NFTs makes you feel?
 - Are you planning to purchase NFTs in the future?
- What are the main reasons why people purchase NFTs?
- What are the benefits of having NFTs? Drawbacks?
- In your opinion, how important for a virtual item to be NFT?
- What attribute makes the NFT attractive to you (people)? Why is that attribute important or desirable to you (people)/What does this feature help to achieve? What is the underlying value/reason/ Why is that (the subject's response) important to you? - **projective laddering technique**

5. Self-expression

- How important is it for you to express yourself (who you are, your personality,

attitudes, beliefs, achievements, status, groups you belong to)? What do you think is important to express?

- What are the ways/how your express yourself?
- How important is it for you to express yourself in virtual worlds?
- Do you express yourself differently in virtual worlds than in physical worlds?

Appendix 2: Study 1 Participants' Description

ID	Pseudonym	Virtual world used	Age	Occupation	Gender	Years in virtual world
1	Adam	Fortnite	27	Professional	M	6
2	Alan	Minecraft	27	Student	M	10
3	Ben	Owner of Kings	25	Student	M	3
4	Benedict	Guild Wars	29	Professional	M	15
5	Agata	Minecraft	28	Professional	F	3
6	Carl	Minecraft	28	Student	M	15
7	Brenda	World of Warcraft	36	Professional	F	18
8	Chris	Call of Duty	35	Professional	M	3
9	Denis	Magic: The Gathering Arena	41	Professional	M	10
10	Daniel	Minecraft	19	Student	M	7
11	Jen	Meta	58	Retired	F	2
12	George	Minecraft	18	Student	M	4
13	Gregory	BGMI	19	Student	M	7
14	Harris	Dota2	30	Professional	M	10
15	Jack	Overwatch2	35	Professional	M	15
16	Jeremy	Meta	62	Professional	M	1
17	Kenneth	Second Life	57	Professional	M	17
18	Leo	Sandbox	26	Professional	M	3
19	Liam	Roblox	18	Student	M	5
20	Kathy	Roblox	25	Professional	F	8 months
21	Lara	Roblox	29	Unemployed	F	1
22	Mike	Meta	20	Student	M	3
23	Mellissa	Overwatch2	30	Professional	F	7
24	Morris	Decentraland	24	Professional	M	2
25	Neo	Decentraland	26	Professional	M	3
26	Neal	Fortnite	23	Professional	M	6
27	Patrick	Decentraland	23	Professional	M	2
28	Ron	Second Life	23	Professional	M	3
29	Steve	Roblox	25	Professional	M	5
30	Tom	Second Life	23	Professional	M	4

Appendix 3: Study 1b Topics Description

Topic	Description
Features	
T1. Aesthetics	The visual characteristics of the item (ex. color, style, design, overall look).
T2. Brand/Creator	The item has a recognized brand or creator.
T3. Customization	Ability to change, update, and customize the characteristics of the item.
T4. Character	The item has a recognized character.
T5. Durability	The item lasts longer and has the ability to withstand wear, damage, or degradation over time.
T6. Future value	The item has the projected monetary worth of an investment at a specified point in the future.
T7. In-game power	The item provides the user with the certain in-game privileges, such as the level of influence, strength, or capabilities a player or character possesses within a video game environment.
T8. Interoperability	The item can be used in different metaverses.
T9. Limited/unique	The item is unique, has a limited edition, a part of the collection, or is difficult to obtain.
T10. Price	The item has an affordable or feasible price.
T11. Representing tastes/features	The item represents the tastes, interests, and characteristics of the user.
T12. Theme	The item is linked to a certain topic, ideal, period, or event (ex. Christmas, concert theme, medieval theme, FIFA, etc.,).
Goals and Values	
T13. Achievement	The item provides a sense of achievement, feeling of fulfilment, satisfaction, or pride that arises from successfully accomplishing a goal, task, or objective.
T14. Appreciation of the effort	The item is purchased to signal the appreciation of the efforts of the creator.
T15. Differentiation	The item helps to distinguish the avatar from other avatars by emphasizing unique features, attributes, or benefits that set it apart.
T16. Enjoyment	The item gives a sense of satisfaction, pleasure, fun, and entertainment.
T17. Feeling part of community	The item helps to obtain a sense of belonging, connection, and inclusion within a group of people who share common interests, values, or goals.
T18. Feeling of control	The item provides a belief that one has the ability to influence or manage outcomes, events, or circumstances in the game.
T19. Feeling of freedom	The item provides a sense of autonomy, independence, and absence of constraints or restrictions.
T20. Fitting environment/avatar	The item feels appropriate and fits the characteristics of the virtual environment and avatar.

T21. Getting access	The item provides permission to enter or use new environments or games within the virtual platform.
T22. Improving communication	The item helps to increase the interaction with others.
T23. Improving performance	The item helps to increase the game performance of the user.
T24. In-game immersion	The item provides a feeling of being deeply engaged and absorbed in the virtual world.
T25. Looking good	The item helps the avatar look more attractive.
T26. Make an impression	The item helps the user to impress others via avatar appearance.
T27. New opportunities	The item provides opportunities that do not exist in the real world.
T28. Projecting features	The item helps to project characteristics, traits, or attributes of a chosen character on the user's in-game representation.
T29. Quality	The item provides a degree of excellence or superiority of something relative to its intended purpose, standards, or expectations.
T30. Save time/money/effort	The item provides a saving of time, money, effort, or future investment benefit.
T31. Self-expression	The item helps to express or send message to others about personality, beliefs, knowledge, and identity of the user.
T32. Signal ownership	The item helps to indicate the possession or having control over a particular item.
T33. Variety	The item provides a sense of diversity, assortment, and novelty.
T34. Vanity/self-esteem	The item creates a feeling of increased pride/admiration in one's own appearance, and achievements, and a person's overall evaluation of his/her own worth, value, and capabilities.

Appendix 4: Study 1b Implication Matrix

Topics	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17	T18	T19	T20	T21	T22	T23	T24	T25	T26	T27	T28	T29	T30	T31	T32	T33	T34	Out-degrees			
T1. Aesthetics														1	4	7				4																43		
T2. Brand/Creator																										1				3							4	
T3. Customization															2																1	2		1			6	
T4. Character																2													6			1		1			10	
T5. Durability																																2					2	
T6. Future value																																1					1	
T7. Ingame power																1					2		1				1									5		
T8. Interoperability																			1	1																	2	
T9. Limited/unique															4	4											1					4	3		1		17	
T10. Price																				1																	7	
T11. Representing tastes/features																																	3				3	
T12. Theme																1													1			4					6	
T13. Achievement																																					0	
T14. Appreciation of the effort																																		1			1	
T15. Differentiation																											2					4					6	
T16. Enjoyment																											1										1	
T17. Feeling part of community																																					0	
T18. Feeling of control																																					0	
T19. Feeling of freedom																																					0	
T20. Fitting environment/avatar																										1											1	
T21. Getting access																																					2	
T22. Improving communication																																						0
T23. Improving performance																																						0
T24. In-game immersion																																						0
T25. Looking good																3	2											3					1				9	
T26. Making Impression																																					1	3
T27. New opportunities																																						1
T28. Projecting features																																						5
T29. Quality																																						7
T30. Save time/money/effort																																						3
T31. Self-expression																																						9
T32. Signal ownership																																						2
T33. Variety																																						2
T34. Vanity/self-esteem																																						0
In-degrees	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	13	28	2	1	2	6	3	2	3	1	12	16	2	6	7	14	29	4	3	2	158		
Abstractness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.50	0.68	0.97	1.00	1.00	1.00	0.86	0.60	1.00	1.00	1.00	0.57	0.84	0.67	0.55	0.50	0.82	0.76	0.67	0.60	1.00			
Centricity	0.27	0.03	0.04	0.06	0.01	0.01	0.03	0.01	0.11	0.04	0.02	0.04	0.01	0.01	0.12	0.18	0.01	0.01	0.01	0.04	0.03	0.01	0.02	0.01	0.13	0.12	0.02	0.07	0.09	0.11	0.24	0.04	0.03	0.01				

Appendix 5: Study 2 Descriptive Statistics

Variable	Frequency in%	Variable	Frequency in%
<i>Gender</i>		<i>Race</i>	
Male	59.1%	White	79.0%
Female	38.5%	Not White	21.0%
Other	2.4%		
<i>Age</i>		<i>Education</i>	
Younger than 25	11.7%	Not Completed High School	0.7%
25-34	32.6%	High School	19.2%
35-39	35.1%	Technical College	17.5%
45-54	15.5%	Bachelor's degree	45.0%
55 and older	5.2%	Master's degree and higher	17.5%
<i>Income</i>		<i>Platform Used</i>	
\$0 or prefer not to answer	3.4%	Meta	3.1%
\$1 to \$ 9 999	11.0%	Decentraland	0.3%
\$10 000 to \$ 24 999	18.2%	Second Life	4.8%
\$25 000 to \$ 49 999	34.7%	Minecraft	23.4%
\$50 000 to \$ 74 999	19.6%	Sandbox	3.4%
\$75 000 and greater	13.1%	Roblox	15.1%
		Fortnite	38.5%
		Other	11.3%

Appendix 6: Study 2 Survey Questions

Construct	Question
Avatar Identification Adopted from Van Looy et al., 2012	<p>Please, rate the degree to which you agree or disagree with each of the following statements about identification with your avatar on your favorite social virtual world/metaverse platform. (1=Strongly disagree, 4=Neutral 7=Strongly agree)</p> <ul style="list-style-type: none"> • I identify myself with my avatar • My avatar has similar appearance/physical characteristics as me in the real world • My avatar has similar personality characteristics as me in the real world • When using the social virtual/metaverse world, I feel like I am inside my avatar <p>When using the social virtual/metaverse world, it is as if I act directly through my a</p> <ul style="list-style-type: none"> • When using the social virtual/metaverse world, it is as if I become one with my avatar • I would like to be more like my avatar • My avatar is a better version of myself • My avatar has characteristics that I would like to have

<p>Self-Expression through Physical Clothing/Accessories Developed by authors</p>	<p>Please rate the degree to which you agree or disagree with each of the following statements about self-expression in the real world. (1=Strongly disagree, 4=Neutral, 7=Strongly agree)</p> <ul style="list-style-type: none"> • The physical clothes/accessories that I own help me to express my SELF-IMAGE of who I am or who I want to be • The physical clothes/accessories that I own help me to express my ACHIEVEMENTS and SOCIAL STATUS of who I am or who I want to be • The physical clothes/accessories that I own help me to express my INDIVIDUALITY, TASTES, and PERSONAL VALUES of who I am or who I want to be • The physical clothes/accessories that I own help me to express the social groups (friends, colleagues, certain brand users, teammates, or any other groups) to which I already BELONG, or want to belong •
<p>Self-Expression through Virtual Clothing/Accessories Developed by authors</p>	<p>Please rate the degree to which you agree or disagree with each of the following statements about self-expression in Virtual World . (1=Strongly disagree, 4=Neutral, 7=Strongly agree)</p> <ul style="list-style-type: none"> • The virtual clothes/accessories that I own help me to express my SELF-IMAGE of who I am or who I want to be • The virtual clothes/accessories that I own help me to express my ACHIEVEMENTS and SOCIAL STATUS of who I am or who I want to be • The virtual clothes/accessories that I own help me to express my INDIVIDUALITY, TASTES, and PERSONAL VALUES of who I am or who I want to be • The virtual clothes/accessories that I own help me to express the social groups (friends, colleagues, certain brand users, teammates, or any other groups) to which I already BELONG, or want to belong
<p>Perceived Enjoyment through Virtual Clothing/Accessories Developed by authors</p>	<p>Please rate the degree to which you agree or disagree with each of the following statements about the experience on your favorite on your favorite social virtual world/metaverse platform. (1=Strongly disagree, 4=Neutral, 7=Strongly agree)</p> <ul style="list-style-type: none"> • The virtual items that I own (clothing, skins, accessories) give me FUN • The virtual items that I own (clothing, skins, accessories) give me ENTERTAINMENT • The virtual items that I own (clothing, skins, accessories) give me a sense of AESTHETICAL PLEASURE • The virtual items that I own (clothing, skins, accessories) provide me with PERSONAL ENJOYMENT
<p>Intention to Purchase Virtual Clothing/Accessories Adopted from Guo & Barnes, 2011</p>	<p>Please, rate your purchasing intention for the virtual goods. (1=Strongly disagree, 4=Neutral 7=Strongly agree)</p> <ul style="list-style-type: none"> • The probability that I would consider buying a virtual item within next 6 months is high • My willingness to buy a virtual item within next 6 months is high • The likelihood of my purchasing a virtual item within next 6 months is high

Functional Consumption in the Physical World	Please rate the degree to which you define your consumption of clothing/accessories in the real world (0=I purchase clothes mostly to satisfy my emotional/social needs, 5=Both, 10=I purchase clothes mostly to satisfy my functional needs).
Type of platform used	What is your favorite social virtual world/metaverse platform where you use virtual items? a) Meta Horizons b) Decentraland c) Second Life d) Minecraft e) Sandbox f) Roblox g) Fortnite h) Other
Gender	Please, identify your gender. a) Male b) Female c) Non-binary /third gender d) Prefer not to say
Age	Please, identify your age. a) Younger than 25 b) 25-34 c) 35-44 d) 45-54 e) 55-and older
Income	Which of these describes your personal income last year? a) \$0 b) \$1 to \$ 9 999 c) \$10 000 to \$ 24 999 d) \$25 000 to \$ 49 999 e) \$50 000 to \$ 74 999 f) \$75 000 and greater g) Prefer not to answer
Education	Please, identify your highest achieved level of education. a) Not completed High School b) High school c) Technical college d) Bachelor's degree e) Master's degree and higher
Race	Choose one race that you consider yourself to be. a) White or Caucasian b) Black or African American c) American Indian/Native American or Alaska Native d) Asian e) Hispanic, Latino, or Spanish origin f) Middle Eastern or North African g) Native Hawaiian or Other Pacific Islander h) Other i) Prefer not to answer

Appendix 7: Study 2 Descriptive Statistics and Convergent Validity of the Main Variables

Construct	Item	Mean	Standard deviation	Factor Loading	Cronbach's alpha	DG	Composite reliability rho_A	AVE
Avatar Identification	<i>IA1</i>	4.488	1.697	0.781	0.92	0.934	0.926	0.615
	<i>IA2</i>	3.808	1.934	0.636				
	<i>IA3</i>	4.017	1.721	0.724				
	<i>IA4</i>	4.137	1.789	0.868				
	<i>IA5</i>	4.337	1.79	0.846				
	<i>IA6</i>	4.113	1.807	0.841				
	<i>IA7</i>	4.089	1.842	0.801				
	<i>IA8</i>	4.024	1.955	0.784				
	<i>IA9</i>	4.619	1.828	0.748				
Self-Expression through virtual clothing/accessories	<i>VSE1</i>	4.732	1.719	0.889	0.891	0.924	0.894	0.753
	<i>VSE2</i>	4.107	1.773	0.854				
	<i>VSE3</i>	4.986	1.545	0.87				
	<i>VSE4</i>	4.337	1.749	0.858				
Perceived Enjoyment through virtual clothing/accessories	<i>PE1</i>	5.502	1.247	0.889	0.892	0.926	0.897	0.757
	<i>PE2</i>	5.491	1.23	0.869				
	<i>PE3</i>	5.649	1.362	0.809				
	<i>PE4</i>	5.522	1.282	0.91				
Intention to purchase virtual clothing/accessories	<i>IP1</i>	5.32	1.705	0.971	0.97	0.98	0.97	0.943
	<i>IP2</i>	5.234	1.734	0.963				
	<i>IP3</i>	5.299	1.729	0.979				
Self-Expression through physical clothing/accessories	<i>PSE1</i>	4.904	1.501	0.885	0.898	0.929	0.899	0.766
	<i>PSE2</i>	4.333	1.645	0.87				
	<i>PSE3</i>	5.038	1.559	0.868				
	<i>PSE4</i>	4.515	1.653	0.877				
Functional consumption in the physical world	<i>PC</i>	5.784	2.606	N/A	N/A	N/A	N/A	
Platform		5.797	1.743	N/A	N/A	N/A	N/A	
Gender		1.433	0.543	N/A	N/A	N/A	N/A	N/A
Income		2.986	1.218	N/A	N/A	N/A	N/A	N/A
Education		3.595	1.011	N/A	N/A	N/A	N/A	N/A
Race		1.21	0.408	N/A	N/A	N/A	N/A	N/A
Age		2.698	1.033	N/A	N/A	N/A	N/A	N/A

Appendix 8: Study 2 Discriminant Validity of The Main Variables

		1	2	3	4	5	6	7	8	9	10
1	Identification with Avatar	0.62									
2	Self-Expression through virtual clothing/accessories	0.49	0.75								
3	Perceived Enjoyment through virtual clothing/accessories	0.23	0.22	0.76							
4	Intention to purchase virtual clothing/accessories	0.19	0.15	0.30	0.94						
5	Platform	0.01	0.01	0.00	0.01	1.00					
6	Gender	0.03	0.00	0.00	0.00	0.00	1.00				
7	Income	0.00	0.00	0.00	0.02	0.01	0.02	1.00			
8	Education	0.00	0.00	0.00	0.00	0.01	0.00	0.09	1.00		
9	Race	0.00	0.00	0.00	0.02	0.02	0.01	0.01	0.07	1.00	
10	Age	0.00	0.00	0.00	0.00	0.00	0.02	0.06	0.01	0.01	1.00

Appendix 9: Post Analysis (Additional Insights)

The following section presents additional analyses that emerged during the course of the research that provide further depth and context to the research findings and open opportunities for further research.

Impact of Self-Expression in the Virtual World on Self-Expression and Consumption Patterns and the Physical World

According to the results of our research, self-expression through virtual clothing/accessories has a positive impact on the intention to purchase virtual clothing/accessories through the mediation route of perceived enjoyment through virtual clothing/accessories. However, one of the intriguing questions that might arise is -“How might self-expression through clothing/accessories in the virtual world impact self-expression through clothing/accessories and consumption patterns in the physical world?”

On one side, there could be a positive link between self-expression in these two worlds. Self-expression in the virtual worlds through virtual clothing/accessories can be related to the personality of the user. For example, it could be expected that a person who has a high need for self-expression expresses him/herself in all spaces. Also, it can be suggested that a person with a higher need for self-expression chooses more expressive patterns of consumption with clothing/accessories having higher emotional/social (vs. functional) value.

As a result, it could be assumed that a person who uses clothing/accessories to express him/herself in the physical world also uses virtual clothing/accessories to express him/herself in the virtual world. In this scenario, self-expressions in both worlds will be positively linked to each other; however, there will be a negative or no

significant link between self-expression in the virtual world and functional (vs. emotional/social) consumption patterns in the physical world.

On the other hand, the relationship between self-expression in virtual and physical worlds could have a negative link. Self-expression in these two worlds can substitute each other, and people who express themselves enough in the physical world would have less intention to express themselves in virtual worlds and vice versa. According to Chernev et al. (2011), people's need for self-expression is finite, and increasing the number of means of self-expression can decrease the self-expressive capacity of each individual means. In other words, since self-expression has a finite capacity, expressing the self through one mean can decrease the need and value obtained from expressing the self through other means. Following this assumption, a person who does not express him/herself fully enough in the physical world will try to shift focus and express him/herself more in the virtual world, and vice versa. As a result, the user who satisfies his/her need for self-expression through virtual clothing in the virtual world has less tendency to express him/herself in the physical world, which also positively impacts more functional (vs. emotional/social) patterns of consumption in the physical world.

Study 1 Results

According to additional insights from Study 1, some users of metaverse/social virtual worlds tend to have more functional patterns of consumption in the physical world while satisfying their emotional and social needs through clothing/accessories in virtual life.

Some users have more functional patterns of consumption in physical life due to personal preferences:

Adam: "I don't like to do shopping in real life. In fact, my housemates are always angry with me because I don't do shopping in my physical life. Shopping in virtual life is more fun".

Chris: "So basically, as a personality, I'm more on function, not fashion. And more functional fashion in real life. So, what I couldn't buy in real life, maybe I'll buy it in a virtual life".

Benedict: "In real life, don't care a lot about the clothes, etc. Instead, in the virtual world, I love them way more".

Some users do not like cluttering or following fashion trends in their physical lives:

Alan: "I hate having too much stuff. So, to satisfy my need of having a lot of stuff having a lot of collections, I usually veer towards virtual things so that I could satisfy my collection urges without physically cluttering my space".

Benedict: "It's because in the real world, when you buy items using clothing, et cetera, after like two or three years. I usually throw them away because they're too old. That's the main reason. Instead, in the game, they don't expire".

Finally, other users have functional consumption as a part of their lifestyle in the physical life. For these types of users, virtual worlds give them opportunities to dress up and express themselves, opportunities that they do not have in the physical world.

Kenneth: "In real life, I never go anywhere fancy, so I don't need formal wear. I never buy anything expensive in real life, always the cheapest I can find. I don't need anything better than that. And I don't like sportswear, I don't buy branded things".

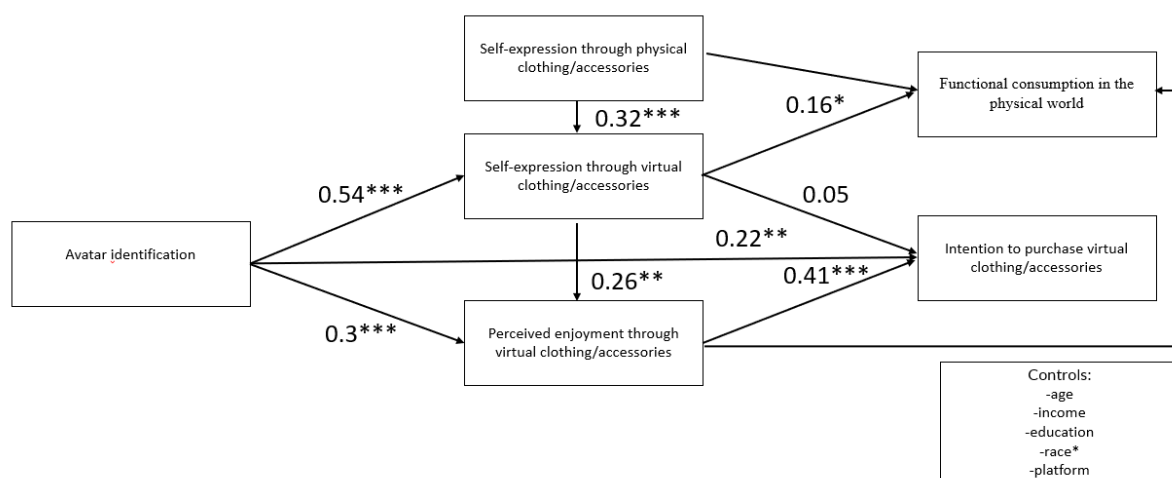
As suggested by the results of Study 1, some metaverse/social worlds users purchase types of clothing/accessories in the virtual world that they would never

consider purchasing in the physical world, due to standards, norms, and judgments that exist in the physical world.

Study 2 Results

Using the insights from Study 1, the links between self-expression in the metaverse/social virtual worlds and self-expression in physical worlds, as well as the links between self-expression in the metaverse/social virtual worlds and patterns of consumption in the physical world, were tested in Study 2 by introducing two additional variables of “Self-expression through physical clothing/accessories” (measured with four question measure on a 7-point Likert Scale) and “Functional consumption in the physical world” (measured on a 0-10 scale, where 0 was Emotional/Social Consumption, while 10 was Functional Consumption). By adding these two variables to the existing framework, the results of SEM-Analysis suggested that self-expression through virtual clothing/accessories, while positively related to self-expression through physical clothing/accessories, also results in more functional (vs. emotional/social) consumption in the physical world-(see the Graph below).

Additional Insights: Results of PLS-SEM Analysis



* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

According to the results of Study 2, self-expression through clothing/accessories in the physical world is positively related to self-expression through clothing/accessories in the virtual world, which means that people who want to express themselves desire to do so in both worlds. At the same time, supporting the results from Study 1, higher self-expression in the virtual world is related to more functional (vs. emotional/social) consumption in the physical world, suggesting that users who express themselves more in the virtual worlds seek to express themselves in the physical worlds as well, but through the less expressive means and more functional (vs. emotional/social) patterns of consumption.

This phenomenon could suggest that self-expression through clothing/accessories in these two worlds takes different forms, considering the boundaries of the physical vs virtual worlds. For example, due to boundaries existing in the physical world, users will try to express only one side of his/herself or use the means of self-expression that are appropriate for the physical world. On the other side, in virtual worlds, since there is more freedom, he/she will express the other side of self or use more expressive means of self-expression.

These insights provide additional perspectives and nuances to the findings, enriching the overall discussion, facilitating a more comprehensive understanding of the research topic, and suggesting the agenda for future research.

CHAPTER 3

Retail Technologies: Boosting Shoppers' Perception of Usefulness or Engagement?

ABSTRACT

Within the last decades, technological innovations have been shaping the market and customer behavior. In the retail industry, to maintain the loyalty of current customers and attract new ones, retailers have been launching shopper-facing technological innovations that provide additional services and enhance customer shopping experiences. However, despite the growing importance of the topic, knowledge about the impact of technologies on shopper behavior is limited. On one hand, academic research in the following field is very fragmented, on the other hand, industry players launch new retail technologies with no clear understanding of the impact of these technologies on shoppers. In the following research, we propose a 2x2 framework where we categorize technologies by the shopper benefits (usefulness vs. engagement) they provide. The research question of the study is “How do technologies that provide different shopper benefits (usefulness vs. engagement) at the pre-purchase stage of the shopper journey impact shopper behavior intentions toward the retailer?” We conducted surveys of shoppers in a Pre-Study to generate a 2x2 Usefulness vs. Engagement framework and in Study 1 - Study 3 to evaluate the impact of technologies that provide different interlinks of usefulness vs. engagement on shopper behavior intentions. As suggested by the results of Study 1- Study 3, the usefulness of technology is a core factor impacting shoppers’ perceived value of their shopping experience and shoppers’ behavior intentions. At the same time, while engagement on its own does not make a significant impact, the combination of engagement and usefulness brings a higher value proposition to shoppers than usefulness alone.

Keywords: retail technologies, usefulness vs. engagement, shopping experience, shopping value

CORE CONTENT

1. Introduction

The retail industry has changed drastically in recent decades due to the development of technologies that have impacted retail operations and shopper behavior. While even before COVID-19, technological innovations such as online retailing, digital payment systems, and mobile shopping were at the peak of their development (Roggeveen & Sethuraman, 2020), COVID-19 has accelerated the pace of development much further, causing retailers not only to modify their back-end operations but also to introduce new ways of shopping for consumers (Roggeveen & Sethuraman, 2020a). As a result, to stay in pace with technological developments and constantly changing shopper behavior, retailers have been making a hard push on developing technologies such as self-checkout lines, robotic assistants, and AR/VR, while launching cutting-edge technologies such as checkout-free stores and personalized subscription services.

Retailers launch innovative technologies to stay competitive by either attracting shoppers through providing service enhancements or reducing costs. When considering the launch of new technologies, many retailers evaluate the impact of technologies using tools such as ROI, payback period, internal rate of return, or return on profits (Inman & Nikolova, 2017). However, retailers often do not have a clear understanding of how these new-launched technologies will impact the shopper journey, what kind of shopper benefit these technologies will provide, and whether the benefits provided align with the retailers' strategies and value propositions. As a result, retailers can adopt the technologies without a clear vision of how these technologies fit into the retailer's strategies and what could be the potential response of shoppers to these initiatives (Inman & Nikolova, 2017).

To evaluate the impact of technologies on retailers' operations, academics provided different types of technology classification. Technologies have been classified as cost-cutting vs. service enhancing (Sethuraman & Parasuraman, 2005), providing shoppers convenience vs. social presence (Grewal et al., 2020), and serving different purposes depending on the stage of the shopper journey cycle (Roggeveen & Sethuraman, 2020). However, up till now, academic research on the impact of retail technologies on shopper behavior and retail operations was very fragmented and, in most cases, evaluated the impact of only one technology at a time.

This research is highly relevant and important as it provides a comprehensive framework for understanding how different retail technologies influence shopper behavior and the overall shopping experience. By categorizing shopper-facing technologies based on their usefulness and engagement benefits and testing the impact of technologies that provide different interlinks of usefulness vs. engagement on shopper behavior intentions, the study offers valuable insights about the benefits technologies need to provide and mechanisms of how technologies impact the shopper behavior. The findings highlight the crucial role of technology usefulness in shaping positive shopper perceptions and behaviors, while also emphasizing that the most impactful technologies combine both usefulness and engagement. Additionally, our study demonstrates that retail technologies impact shopper behavior intention through the mediating link of shopper perceived value of the shopping experience, which explains the mechanism behind it.

This research brings value both to academic researchers and industry experts. First, it adds input to the pool of literature focused on the impact of technologies on shopper behavior, where we suggest evaluating the effectiveness of retail technologies by understanding the interlink of the usefulness vs. engagement

benefits they provide. Second, unlike current research that primarily studies the impact of one technology at a time, this research investigates the impact of several different technologies across three different shopping scenarios, offering a better comparison and a more holistic picture of the impact of technologies on shopper behavior. Finally, by classifying 12 different technologies and explaining the mechanism of how technologies make an impact on shopper behavior intentions, this research brings value to retailers seeking to implement innovations that enhance customer satisfaction and drive business outcomes.

The article is organized as follows. We start with theoretical background and hypothesis development. Then, we move to the empirical overview, where we discuss the design, analysis, and results of Pre-Study and Study 1 - Study 3. Finally, we conclude with a discussion of results, conclusions, and limitations.

2. Theoretical Background

2.1. Consumer Benefits and Innovations

Following a demand-side perspective of management research, creating consumer benefits is crucial for companies, because consumers experiencing the benefits create revenue streams in the form of additional payments, thereby creating value for the companies (Priem, 2007). That is why, according to Priem (2007), firm strategies need to be designed to increase consumer benefits by identifying novel resource combinations that maximize consumer use value. One strategy to increase consumer benefits through novel resource combinations is launching innovations. According to Adner and Levinthal (2001), the consumer value of innovation is impacted by both innovation characteristics and consumer characteristics. On one side, the innovation needs to provide additional functionality to consumers. On another side, the value of innovation depends on the minimum functionality threshold

that consumers have, and that the product needs to reach to be valued by the consumers (Adner & Levinthal, 2001). However, it can be argued that apart from providing only functionality benefits, innovation also needs to provide emotional benefits. For example, when consumers access the product, they do so not just in functional terms of expected performance, but also in terms of enjoyment and social value derived from the product (Sweeney & Soutar, 2001). Therefore, it can be suggested that to create value for themselves, companies need to focus on creating value for consumers, and one way to achieve this is by launching innovations that provide functional and emotional benefits.

In the retail context, in addition to product innovations, another type of innovation is retail service innovations, which focuses on improving shoppers' purchase process rather than the actual product offered (Lamey et al., 2021). Retail service innovations could include different store layouts, store atmospherics, salesforce service, and the launch of new technologies. Previous studies showed that shoppers expect new technologies to satisfy both the functional and experiential sides of shopping (Burke, 2002). However, shoppers' appreciation of functional vs. emotional benefits provided by an innovation depends on the stage of the shopper journey (Lamey et al., 2021) because shoppers have different needs at different stages of the shopper journey. For example, Lamey et al. (2021) in their study suggested that the impact of retail service innovations on shareholder value (reflection of anticipated customer benefit provided by innovation) depends on the type of benefit the innovation aims to provide (convenience vs. engagement), the stage of the customer purchase process (pre-purchase, purchase, or post-purchase), and the type of retailer. They found support for the claim that service innovations high on emotional benefit (engagement) create higher shareholder value in the post-purchase stage, while

innovations high on functional benefit (convenience) do so in the purchase stage, but primarily for retailers selling utilitarian products (Lamey et al., 2021). Additionally, according to shopping orientation theory, shoppers have different motives such as task-focused vs. experiential orientations, which affect the overall value of shopping trips (Büttner et al., 2013). When shopping under a task-focused orientation, shoppers aim to receive utilitarian shopping value, such as making shopping in an efficient and effective way, while when shopping under an experiential orientation, shoppers aim to receive hedonic shopping value, be entertained, or obtain enjoyment from the shopping process (Büttner et al., 2013).

That is why, to be coherent with the needs that technologies could satisfy, and the benefits associated, we limited the scope of our research only to shopper-facing technologies used at one stage of the shopper journey – the pre-purchase stage and only for non-fast-moving consumer goods. In our research, the functional component of shopper value provided by new technologies we referred to as the perceived usefulness of technologies, while the emotional component is referred to as perceived engagement. Since both functional and emotional components can be equally important at the pre-purchase stage (Lamey et al., 2021), we suggest that the higher value of convenience or engagement provided by innovative technology at the pre-purchase stage leads to a better perception of the quality of the overall shopping experience that shoppers have in retail stores and results in more positive future shopper behavior intentions.

2.2. Hypotheses Development

Technology Type by Shopper Benefits

In building our typology of additional benefits that technologies provide when shoppers search, evaluate, and compare the products, we divided the benefits into functional and emotional benefits, or usefulness and engagement.

A similar classification was given by Grewal et al. (2020), where the authors classified technologies by the benefits of convenience and social presence, and by Lamey et al. (2021), who classified service innovations by the benefits of convenience and engagement. In our classification, we expand the concept of convenience used by both authors into a broader concept of usefulness. Additionally, we suggest that the emotional part of shopper benefits consists not only of social value in the form of social presence, as suggested by Grewal et al. (2020), but also includes enjoyment, focused attention, and gamification. Therefore, in our study as a representation of emotional benefits, we include the concept of engagement.

Different technologies can provide varying levels of usefulness and engagement benefits for shoppers. Based on the Usefulness vs. Engagement scales, we propose that all technologies can be categorized and plotted into the 2x2 framework with four quadrants:

- 1) High Usefulness /Low Engagement - technologies that provide only usefulness
- 2) Low Usefulness /High Engagement - technologies that provide only engagement
- 3) High Usefulness/High Engagement - technologies that provide both usefulness and engagement

- 4) Low Usefulness /Low Engagement - technologies that provide neither usefulness nor engagement

Usefulness - the degree to which a shopper believes that using a particular technology would enhance his or her job performance (Peukert et al., 2019).

Examples of usefulness benefits obtained during the pre-purchase stage could include the ease of obtaining relevant information about the product, time saved in the evaluation of choices, and efforts saved in making purchasing decisions. In the current era of information overload, shoppers look for shortcuts and ways to obtain information with less time and less physical and cognitive effort. Consequently, spending less time and effort during the pre-purchase stage improves the efficiency of the shopping process, by making it faster and simpler, and increases shopping effectiveness by facilitating the shopping tasks (Lamey et al., 2021), which results in more favorable technology evaluation (Grewal et al., 2020) and more positive evaluation of the overall shopping experience. For example, QR codes can help shoppers to find relevant information faster, digital store maps – reduce physical efforts in store navigation, and instore kiosks – reduce cognitive efforts by instantly comparing prices and product features.

The concept of usefulness is part of TAM (technology acceptance model) and is a widely used concept in academic literature. In our study, we implement the approach used by Peukert et al. (2019). Just like Peukert et al. (2019), we measure this construct with shoppers' perception of improved performance (saving time or money), productivity (making decisions or finding information within the shortest time frame), effectiveness (getting the best deal or finding the most product information), and usefulness.

Engagement - the shopper's emotional involvement beyond the purchase and the degree to which the retailer can design shopper experiences that evoke this involvement (Sorescu et al., 2011; Van Doorn et al., 2010). People could be shopping not just for the purpose of acquiring the products, but also because they want to be emotionally involved in the shopping process. Emotional involvement at the pre-purchasing stage can be associated with feelings of fun, entertainment, and enjoyment during the use of technology. Thus, emotional involvement creates engagement links between the shopper and retailer, enhancing the shopping experience. For example, VR technologies can help create a novel, enjoyable experience, interaction with instore robots and voice assistants can alert the feeling of fun while shopping, while video calls can enhance the feeling of socialness.

Engagement is a widely studied construct in academic literature that consists of several sub-constructs. In accessing the construct of engagement, we follow the approach of de Canio et al. (2021), who applied the established in literature concept of engagement consisting of focused attention, enjoyment, and socialness with an additional sub-construct of gamification.

Focused attention can be defined as cognitive absorption and being in the flow state when a person's awareness is focused solely on the activity itself (Hsu & Lu, 2004). During the use of technology, the shopper can increase focused attention on aspects of the experience, which results in a higher level of engagement (de Canio et al., 2021; Diehl et al., 2016). For example, while using VR or AR technologies, shoppers can become immersed in the experience and narrow his/her attention only to the visual aspects of choosing a product.

Enjoyment is another sub-construct of engagement. It can be defined as the positive mood experience and state of pleasure during the shopping activity (de Canio et al.,

2021). According to the literature, the emotional state during shopping can have a significant impact on shopping behavior (Huang et al., 2007), where enjoyment increases the levels of shopping engagement (de Canio et al., 2021) and is directly linked to a higher willingness to buy (Bues et al., 2017).

Socialness can be referred to the social interactions that the shopper performs during or after the shopping experience. Technology can be a mean that gives the shopper an opportunity to express social behavior, such as social interactions at the stores, WOM passed to relatives and friends, or interaction in online communities (de Canio et al., 2021). Therefore, it is suggested that socialness associated with technology makes a positive impact on shopping engagement (de Canio et al., 2021).

Gamification, which can be referred to as a gameful and ludic experience felt by people when using technology, is becoming a popular research topic that focuses on understanding the ways interactive technologies enrich the user experience (de Canio et al., 2021). According to de Canio et al. (2021), gamification is related to the use of game design in a non-game context, and in the shopping context, through generating positive experiences for the user engaged in the activity, gamification can alter the experimental aspect of shopping, such as engagement, enjoyment, and flow.

Relationship between Technology type by shopper benefit and Perceived value of the shopping experience

Prior research has indicated that perceived value plays an important role in the formation of shoppers' satisfaction and influencing their future behavior (Qin et al., 2021). The perceived value of the shopping experience is the value perception obtained by shoppers from the difference between the benefits received during the shopping process and the sacrifices made to obtain those benefits (Inman & Nikolova, 2017). In the context of shopping with the use of technologies, in exchange for usefulness or engagement benefits provided by technology, shoppers might face several costs, such as time and cognitive efforts spent on learning new technology, time spent on shopping with technology, personal data that need to be shared with the retailer, or possible monetary sacrifices involved. The benefits that technologies aim to provide will not make a significant impact on the shopper's perceived value of their shopping experience and the shopper's behavior intentions if there are high costs associated with using technologies.

Additionally, it is not given that benefits provided by technology will impact the perceived value of the shopping experience due to shoppers' attitudes towards retailers' launches of technologies. For example, shoppers might believe that retailers launch new technologies for opportunistic reasons such as being in trend with the market, cutting costs, or getting something from shoppers. Due to these negative attitudes, the use of technology may not be perceived as an add-on value to the perceived value of the shopping experience. For example, shoppers might think that retailers launch technologies only to keep up with competitors and be in trend with the market. In this case, the launch of retail technology might be perceived as a must-have, and the use of technology will not be perceived as a source of additional value. Also, shoppers might have an attitude that retailers launch new

technologies only to cut expenditures by reducing staff, making shoppers do the store consultants' work, or collecting the shopper data. All these shoppers' concerns might affect the impact of benefits provided by technology on the shoppers' perceived value of the shopping experience. Therefore, to maximize the shoppers' perceived value of the shopping experience, retailers should decrease costs, increase the benefits offered (Dodds et al., 1991), and mitigate possible negative attitudes toward technology use.

In our study, when controlled for possible costs associated with the use of technology, we expect that using technologies in the pre-purchase stage that provide additional benefits to shoppers (usefulness or engagement) will result in a higher perceived value of the overall shopping experience compared to using technologies that provide a low level of those benefits.

On one hand, by using technologies that provide usefulness, shoppers feel that they obtain additional benefits in terms of saved time and effort. Since time is a limited scarce resource and shoppers have limited cognitive resources (Berry et al., 2002), shoppers value usefulness benefits, while retailers aim to simplify shoppers' tasks by providing means to complete these tasks faster and with less effort (Lamey et al., 2021). Also, apart from saving time and effort, usefulness can form a perception that technology helped to make a better shopping decision, which also could impact the perceived value of the shopping experience. Therefore, we expect that shoppers' use of technology providing an additional benefit of usefulness to make a positive impact on the shopper perceived value of the shopping experience.

H1a: Using technologies that provide a high level of usefulness (High Usef./ Low Eng.) results in higher shopper perceived value of the shopping experience than using technologies that provide a low level of both benefits (Low Usef./ Low Eng.)

On one hand, by using technologies that provide engagement, shoppers can create emotional bonds with technology and retailer, because shoppers feel more emotionally involved during the pre-purchase stage either because of having an immersive experience, enjoyment during and after the use of technology, the social connection that technology provides, or ludic experience and feeling of fun. These engagement retail innovations create not only additional value ties but also active customer involvement which results in an emotionally stimulating shopping experience (Sorescu et al., 2011).

However, it is not guaranteed that shoppers will perceive an emotional part of the experience and additional engagement obtained after the use of technology as an added value in the overall shopping experience. On the other hand, engagement can be perceived simply as “entertainment” that does not create any additional value to the shopping experience. In this case, technologies providing engagement will not make any impact on the perceived value of the shopping experience. On the other hand, technologies providing engagement may even be perceived as having a negative impact on the perceived value of the shopping experience. For example, since technologies providing engagement are usually associated with focused attention, entertainment, and enjoyment, their use can be associated with distraction from the main activity of shopping. Also, additional engagement can be associated with additional costs of time and effort invested, which could negatively impact the perceived value of the shopping experience. Nevertheless, we suggest that perceived engagement obtained after using technologies during the pre-purchase stage will be associated with additional value and make a positive impact on the perceived value of the shopping experience.

H1b: Using technologies that provide a high level of engagement (Low Usef./ High Eng.) results in higher shopper perceived value of the shopping experience than using technologies that provide a low level of both benefits (Low Usef./ Low Eng.)

While it is difficult to define which benefit (usefulness or engagement) is more appreciated by shoppers because shoppers are heterogeneous in their preferences, we propose that technologies providing both usefulness and engagement to have a stronger impact on shopper behavior intentions than technologies that are high in only one benefit (usefulness or engagement).

H2: Using technologies that provide a high level of both usefulness and engagement (High Usef./ High Eng.) results in higher shopper perceived value of the shopping experience than using technologies that provide a high level of only one of the benefits (High Usef. / Low Eng. or Low Usef. / High Eng.)

Relationship between the Perceived value of the shopping experience and Shopper behavior intentions

Two main shopper behavior activities that have a positive impact on retailer operations are retailer patronage and positive word of mouth (WOM) generated (Inman & Nikolova, 2017). In our study, we follow Inman and Nikolova (2017) approach and merge retailer patronage and WOM intentions in one construct of “Shopper behavior intentions”.

Retailer patronage is a measurement of purchasing intention and the intention to come back to the store. Converting shoppers into “patrons” by enhancing their relationship with them is a key task of retailers aiming to increase their competitiveness and sales (Pizzi et al., 2020). Retailer patronage can impact the sales of the retailer by increasing the demand of shoppers in terms of additional

product categories purchased and by switching from other retailers to the focal retailer (Inman & Nikolova, 2017).

Another important shopper behavior is WOM created. The positive WOM generated is a propensity to generate positive content about the retailer as a result of the shopping experience. WOM communication is a powerful communication tool to attract new shoppers. Moreover, WOM can be more persuasive than traditional media channels (Villanueva et al., 2008), because customers acquired through WOM contribute twice as much long-term value as those acquired through traditional channels (Villanueva et al., 2008).

As discussed in previous academic literature, the positive value of the shopping experience makes a positive impact on shopper behavior by creating retailer patronage and positive WOM (Cronin et al., 2000; Inman & Nikolova, 2017). If a shopper has a positive value of the shopping experience at a retail store, he/she will have a stronger willingness to initiate and complete a purchase and come back to the same store or retailer in the future. In addition, by having a strongly positive shopping experience, shoppers tend to share information about this retail experience with his/her friends and relatives. This can result not only in additional emotional connection and loyalty of the original shopper but also in bringing new customers to the retailer.

Relationship between Technology type by shopper benefit and Shopper behavior intention

Since the use of technology that provides additional shopper benefits (usefulness or engagement) affects the perception of the shopping experience, and the value of the shopping experience, in turn, impacts the shopper behavior intentions, the relationship between technology type by shopper benefit and shopper behavior intention is mediated by the perceived value of the shopping experience.

H3a: Using technologies that provide a high level of usefulness (High Usef./ Low Eng.) results in higher shopper behavior intentions than using technologies that provide a low level of both benefits (Low Usef./ Low Eng.) with shopper perceived value of the shopping experience mediating the effect

H3b: Using technologies that provide a high level of engagement (Low Usef./ High Eng.) results in higher shopper behavior intentions than using technologies that provide a low level of both benefits (Low Usef./ Low Eng.) with shopper perceived value of the shopping experience mediating the effect

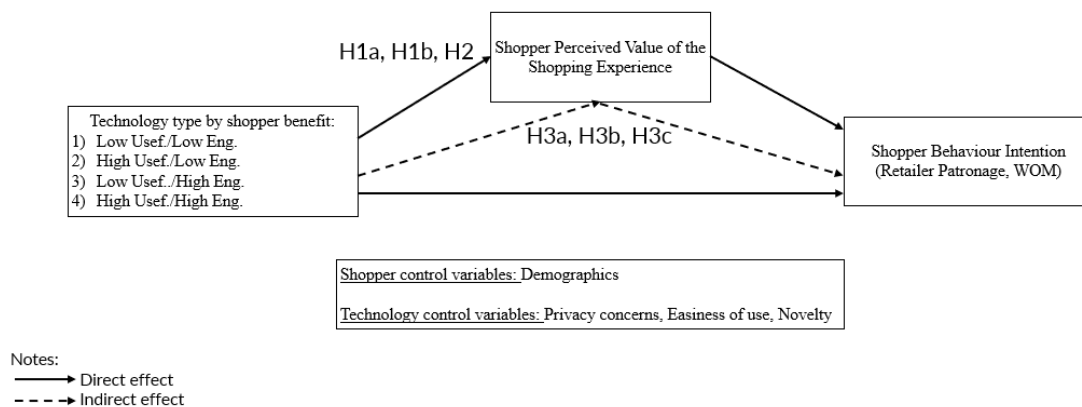
Since the positive value of the shopping experience created after using technologies impacts shopper behavior intentions, the higher the shopper perceived value created after using the technology, the stronger the impact of the technology on shopper behavior intentions. Depending on the usefulness vs. engagement tradeoffs, the overall value of the shopping experience may vary between technologies and shoppers. However, we expect that using High Usef./High Eng. technologies to create the highest level of the perceived value of the shopping experience, compared to the remaining types of technologies.

H3c: Using technologies that provide a high level of both usefulness and engagement (High Usef./ High Eng.) results in higher shopper behavior intentions

than using technologies that provide a high level of only one of the benefits (High Usef./ Low Eng. or Low Usef./ High Eng.) with shopper perceived value of the shopping experience mediating the effect.

Our conceptual framework is presented in Figure 1. The basis of our conceptual framework is the impact of the use of retail technologies that vary by type of shopper benefits on shopper behavior intention via alerting the shopper perceived value of the overall shopping experience.

Figure 1: Conceptual Model



Control Variables

As discussed earlier, “Shopper perceived value of the shopping experience” is defined as the net benefit obtained, excluding the “cost” parameters. Since in our scenario of technology use, there are no monetary costs involved, the costs that shoppers can incur are additional time, effort, or other non-monetary costs that the shoppers could experience during the use of technology. These perceived costs can be an attribute of technology itself (technology variables) or can vary based on shopper characteristics (shopper variables). These technology and shopper variables can affect the perception of benefits that technologies provide and impact

both the shopper perceived value of the shopping experience and shopper behavior intention. Therefore, we need to include them as control variables.

Shopper variables - different shopper characteristics that could affect the impact of different technologies and their benefits on the evaluation of the shopping experience. The shopper variables that we include in our study are demographic characteristics that could make an impact on the perception and attitudes toward technologies. Attitudes and perceptions of technologies could impact drastically the benefits perceived from the use of technology and can vary by the demographics of users. For example, older, lower-income, and less educated shoppers could have more negative attitudes toward technologies, impacting both the perceived value of the shopping experience and shopper behavior intention after using technologies.

Technology variables - technology characteristics that could affect the impact of different technologies and their benefits on the evaluation of the shopping experience. Some “costs” that shoppers can incur after using technologies include personal data that shoppers share during technology use and additional time/effort invested in using the technology. The “cost” associated with using technology can vary by the technology characteristics of each technology type.

One of these characteristics is Privacy concerns associated with technology use. Technologies might raise privacy concerns when shoppers fear retailers might misuse their private information (Inman & Nikolova, 2017), which can undermine the benefits perceived during the use of technology. In our study, we use the established in literature construct of “Privacy concerns” consisting of four dimensions: data collection, improper access, data accuracy, and unauthorized secondary usage concerns (Grosso et al., 2020; Smith et al., 1996). During the shopping process, shoppers might worry that they give away too much of their personal information to

retailers, which retailers might use incorrectly or with non-intended goals. However, privacy concerns can be context-dependent (Grosso et al., 2020). For example, shoppers feel uncomfortable when their personal data is combined with geolocation data (Guha et al., 2021). If shoppers feel relatively comfortable getting a personalized recommendation on the online channel, the same type of recommendations might result in feeling tracked when received offline, which can create a negative experience with technology. Thus, different technologies can generate different levels of privacy concerns, depending on the features of the technology and the amount of personal data that shoppers need to share while using this technology.

Another important characteristic of technology is its Ease of use. Perceived ease of use can be defined as the degree to which a person believes that using technology will be effortless (Davis, 1989). In the well-known TAM (technology acceptance model), the authors argue that to be better perceived, the technology needs to provide usefulness and ease of use (Davis, 1989). According to the literature, perceived ease of use makes a positive impact on shopper attitude toward the technology (Bigne, 2021), therefore this variable can make an impact on shopper behavior intentions and perceived value of the shopping experience. Ease of use can vary by technology type and can be associated with less time and effort invested during technology use.

Finally, the third characteristic is the technology Novelty of use. The novelty of use can have a double effect on the evaluation of the shopping experience. On one hand, previous experience with technology increases shoppers' intentions to use it in shopping because previous experience enhances shoppers' expertise and knowledge of using the technology and makes shoppers more likely to use this

technology (de Canio et al., 2021). Therefore, less novel technology requires less time/effort costs and builds shopper confidence in using it. On another hand, the benefits provided by innovation might have diminishing returns (Adner & Levinthal, 2001) and can depend on the novelty of experience, when the first use of innovation makes a strong effect, but each next time makes a weaker effect on the perception of obtained benefit.

3. Empirical Overview

Since the technologies tested are not fully diffused in the market and some technologies are still perceived as futuristic, the shopper reactions in the actual shopping scenario are difficult to measure. That is why all studies measured shopper reactions in hypothetical rather than actual shopping scenarios. Measuring shoppers' reactions in a hypothetical scenario is a widely used approach in experimental studies. The evaluation of the use of technologies in hypothetical scenarios was used by Garaus et al. (2021), Inman and Nikolova (2017), Mende et al. (2019) and according to Davis and Venkatesh (2004), when evaluating the technologies, hypothetical scenario constructs measures can closely approximate hands-on based construct measures and are significant predictors of usage and behavior intentions. In our study, we asked participants to imagine their future experience of using technologies at the pre-purchase stage and how this use might impact their imaginary shopping experience.

3.1. Pre-Study. Classification of Technologies

The categorization of retail services, which includes the majority of technologies in the list, was previously done in the study by Lamey et al. (2021), where retail services were ranked on a scale of convenience vs. engagement by five retail experts. In our study, we also use the concept of engagement but substitute the concept of convenience with a similar concept - usefulness. Additionally, since our study focuses on shopper perception of technologies, we propose that the categorization of technologies be performed by shoppers.

3.1.1. Experimental Procedures

(This study was preregistered at https://aspredicted.org/3V2_R66)

To understand the benefits provided by the use of technologies during the pre-purchase stage, we asked the participants to imagine the use of 13 technologies at the pre-purchase stage. We chose the most common technologies used at the pre-purchase stage, assuming that the imaginary scenario will be a close representation of an actual scenario and an actual evaluation of perceived benefits. Participants of the study (n=201, 43% female, 72% white or Caucasian, 35% Urban, 66% older than 35 years) were recruited on Amazon's Mechanical Turk and completed the study in exchange for a small payment. They were asked to imagine the pre-purchase stage of the shopping journey with the use of technologies and evaluate the benefits (usefulness and engagement) obtained after using each technology, using a 7-point Likert scale (1="completely disagree" to 7="completely agree"). The list and description of all technologies can be found in Appendix 1.

3.1.2. Variables and Measures

The operationalization of variables employed in the Pre-Study can be found in Table 1. Confirmatory factor analysis, performed by SEM package in Stata, of 4 questions of the Usefulness variable (with factor loading ranging from 0.88 to 0.92) indicated

satisfactory reliability and support for the creation of one single measure since Cronbach's alpha supported the reliability for a single scale ($\alpha=0.93$). Similarly, confirmatory factor analysis of 6 questions of the Engagement variable (with factor loading ranging from 0.62 to 0.89) indicated satisfactory reliability and support for the creation of one single measure since Cronbach's alpha supported the reliability for a single scale ($\alpha=0.89$).

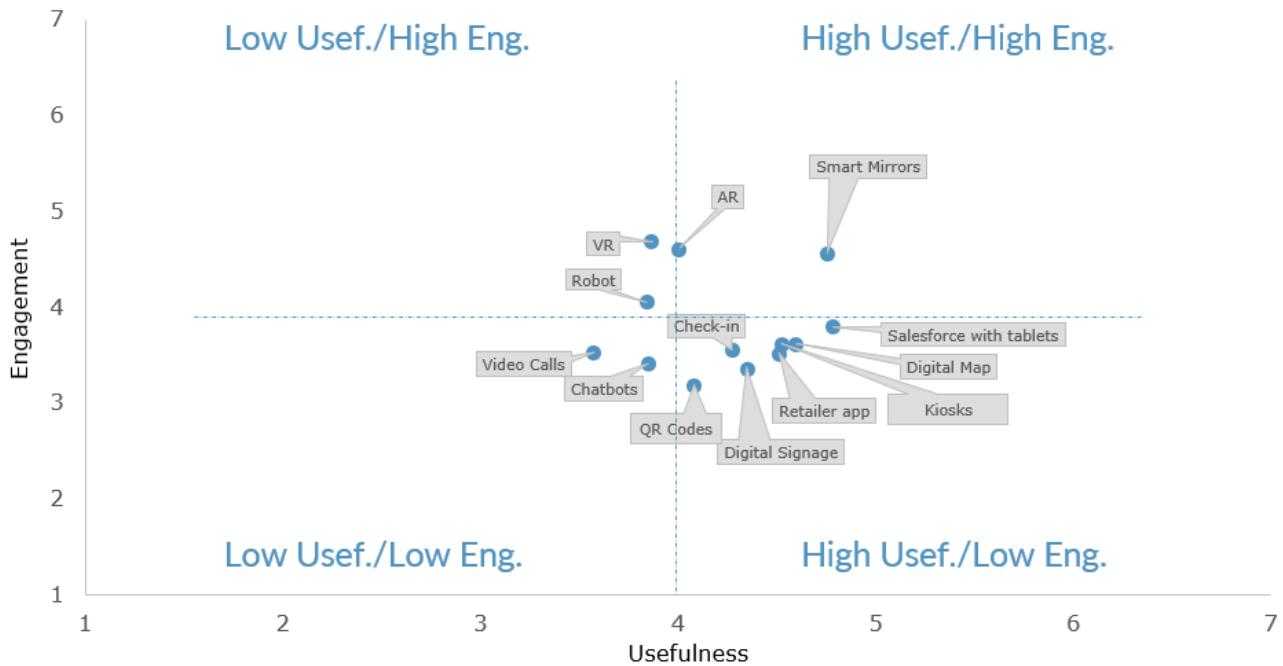
Table 1: Variables, Measures, and Operationalization

	Sub-Construct	Question	Factor Loading
Usefulness Adapted from Peukert et al., 2019 $\alpha=0.93$		Please, imagine using the technologies and rate them by stating how much you agree with the following statements (1-Strongly disagree, 4-Neutral, 7-Strongly agree).	
	Performance	· Using this technology will improve my shopping performance (save time or money)	0.88 $p<0.001$
	Productivity	· Using this technology will improve my shopping productivity (make purchase decisions or find product information within the shortest time frame)	0.92 $p<0.001$
	Effectiveness	· Using this technology will enhance my shopping effectiveness (get the best deal or find the most product information)	0.91 $p<0.001$
	Usefulness	· I will find this technology useful when shopping	0.91 $p<0.001$
Engagement $\alpha=0.89$	Focused attention Adapted from De Canio et al., 2021	· Using this technology will make me so involved and absorbed in the shopping process that I will lose track of time	0.83 $p<0.001$
	Enjoyment Adapted from Grewal et al., 2020	· Using this technology will be enjoyable	0.85 $p<0.001$
		· Using this technology will be fun	0.89 $p<0.001$
	Socialness Adapted from De Canio et al., 2021; Grewal et al., 2020	· Using this technology will give me an opportunity to talk about this experience with my friends later	0.85 $p<0.001$
		· Using this technology will make me feel the presence of others while shopping	0.62 $p<0.001$
Gamification Adapted from De Canio et al., 2021	· Using this technology will make me feel like playing a game	0.77 $p<0.001$	

3.1.3. Results

In Figure 2, we present a 2x2 framework, where 13 technologies are mapped on the basis of usefulness vs. engagement benefits they provide during the pre-purchase stage of the shopper journey.

Figure 2: Usefulness vs. Engagement Framework



Based on the usefulness vs. engagement variables, all technologies are categorized and plotted into the 2x2 framework that has four quadrants, where low levels of the benefit provided (usefulness or engagement) refer to the shopper's perception that the particular technologies provide a negative level of benefit (usefulness or engagement), while high levels of the benefit provided refer to the perceived positive level of benefit (usefulness or engagement) acquired after use of technology.

The technologies that have a score less than "4" on the Usefulness (Engagement) scale are categorized as low Usefulness (Engagement) technologies because respondents disagree that these technologies provide the Usefulness (Engagement) benefit. Alternatively, the same logic applies to the technologies that have a score higher than "4" and are categorized as High Usefulness (Engagement) technologies.

Additionally, in the proposed framework, 13 technologies used at the pre-purchase stage are not only plotted into four quadrants but also differentiated between each other within quadrants on a 1-7 scale regarding the level of shopper perceived benefit the technologies provide.

3.2. Study 1 - Study 3

All three studies had the same design, but different shopping scenarios. The goal of this research was to check the impact of different technologies in the pre-purchase stage for non-FMCG products. To align with this goal but still obtain the generalizability of results, we chose three shopping scenarios for different types, but still non-FMCG products, where shoppers spend a considerable amount of time in the pre-purchase stage. In Study 1, respondents were asked to imagine the use of technologies in the fashion scenario, in Study 2 - in shopping for consumer electronics, and in Study 3 - in shopping for furniture.

Based on the results of the Pre-Study, we chose four technologies from different quadrants that could be used in all three shopping scenarios to test their impact on shopper behavior intentions. To have more robust results, we chose technologies that are far away from each other in the proposed 2x2 framework. At the same time, we tried not to choose technologies (where possible) that are plotted very close to the threshold value of "4", the value that separates quadrants between the low and high value of the benefit provided.

The technologies that were chosen are the following:

- Low Usef./Low Eng. Quadrant - **Chatbot**
- High Usef./Low Eng. Quadrant - **Instore kiosk**
- Low Usef./High Eng. Quadrant - **Robotic assistant**
- High Usef./High Eng. Quadrant - **Augmented Reality (AR)**.

The description of the chosen technologies is below:

Chatbot - an online software that simulates human-like conversations with users via text messages on chat. Many companies nowadays use chatbot technologies to substitute human customer service, solve issues with handling large volumes of customer requests, and ease shoppers' purchasing processes (Moriuchi et al., 2021). However, chatbots should not be positioned as an engaging technology but rather as a communication tool to easily provide shoppers with the information needed (Moriuchi et al., 2021). Therefore, for proper integration of chatbots in retailer operations, retailers should understand how and when this technology provides the most benefit for shoppers and whether it translates into shoppers' behavior.

Instore digital kiosk - a machine consisting of a touchscreen, a computer, a printer, and a credit card reader that can deliver information, promote, or sell products and services (Inman & Nikolova, 2017). While kiosks can be used to add value at different stages of the shopper's journey, the primary stage of using them is the pre-purchase stage. Instore kiosks can provide usefulness in the form of information about products, services, and promos that shoppers can easily access. Additionally, kiosks can alert engagement via focused attention, gamification, and enjoyment associated while using the technology. According to Lao et al. (2021), digital kiosks impact shopper behavior intentions and perceived shopping value through sensorial, pragmatic, cognitive, and social dimensions of the shopper experience.

Robotic assistant technology - Robots (static or mobile), usually located at the door or aisle entrances. They greet customers, interact and talk, and answer questions in a human-like manner. They can register customer feedback and provide information about prices, products, discounts, aisle guidance, and other information. Robotic assistants can enhance the in-store social environment and create a more rewarding

customer experience (Moore et al., 2022), especially when shoppers shop in groups. In group shopping, Robotic assistants enable shoppers to engage in shared entertainment through hedonic interaction with a robot that creates a more enjoyable customer experience (Moore et al., 2022). Additionally, in comparison to Instore kiosks, Robotic assistants are more effective in converting passerby shoppers into actual buyers (Brenngman et al., 2021). Due to the higher ability of robotic assistants to create engagement and attract customers into stores, they can lead not only to a larger audience to undergo the state of POS conversion but also to a higher conversion rate and elicit more sales (Brenngman et al., 2021).

AR technology - an online application that helps customers visualize how the item will look in their setting (for example, the shopper can take a picture of themselves and see how the dress/suit will look at them in different colors, styles, etc., or see how the furniture/domestic appliances will look in their apartments). Some key uses of AR in the retail context are entertaining shoppers, educating shoppers, and helping them evaluate the product fit (Tan et al., 2022), all of which contribute to the pre-purchase stage of the shopping experience. One of the key benefits of using AR is that it reduces the uncertainty related to product fit (Sun et al., 2022; Tan et al., 2022), which can contribute to the usefulness of the technology benefit. Also, shoppers' inspiration and interactivity generated while using the AR technology, significantly affect the shoppers' flow experience, which ultimately can be translated into higher engagement, higher brand attitude, and higher brand usage intent (Arghashi & Yuksel, 2022). Overall, AR can be assessed as a technological mean that improves shopper experience, enforces engagement, and influences purchasing intentions (Qin et al., 2021).

3.2.1. Experimental Procedures

(The studies were preregistered at https://aspredicted.org/9DM_WSR, https://aspredicted.org/DRJ_9Q6, https://aspredicted.org/JC9_ZFD)

To understand the perceived value of the shopping experience and shopper behavior intentions after using four technologies during the pre-purchase stage, we asked participants to imagine the use of these technologies. We assumed that the imaginary scenario would be a close representation of an actual scenario and an actual evaluation of the perceived value of the shopping experience and shopper behavior intentions.

The studies employed a between-subjects design where participants were assigned to one of four conditions (Chatbot, Instore kiosk, Robot, or AR). Participants in Study 1 (n=399, 48% Male, 65% white or Caucasian, 46% Urban, 48% older than 35 years), in Study 2 (n=401, 44% Male, 72% white or Caucasian, 35% Urban, 62% older than 35 years), in Study 3 (n=399, 49% Male, 64% white or Caucasian, 40% Urban, 53% older than 35 years) were recruited on Prolific platform and completed the study in exchange for a small payment.

Participants were randomly assigned to imagine their experience of shopping for Fashion (Study 1), Consumer Electronics (Study 2), or Furniture (Study 3) at the pre-purchase stage of the shopper journey with the use of one out of four technologies (Chatbot, Instore kiosk, Robots, or AR) and were asked to imagine their value of the shopping experience and shopper behavior intentions (WOM and retailer patronage) after using the technologies, using a 7-point scale (1-Much lower than before, 4-The same as before 7-Much higher than before).

3.2.2. Variables and Measures

A comprehensive list of the variables employed in our survey, with details on their operationalization, is shown in Appendix 2.

Independent Variable: Technology Type by Shopper Benefit

As an independent variable, we have included a categorical variable “Technology type by shopper benefit” which consisted of four technologies (Chatbot, Instore kiosk, Robotic assistant, and AR) located in different quadrants of the 2x2 Usefulness vs. Engagement framework. The impact of each type of technology by shopper benefit on shopper perceived value of the shopping experience and shopper behavior intentions was compared between technologies.

Mediator Variable: Shopper Perceived Value of the Shopping Experience

The perceived value of the shopping experience as a result of using technology is a mediator variable of the impact of the type of technology by shopper benefit on the dependent variable. Respondents were asked to rate the change in their overall shopping experience as a result of using technologies on a 7-point scale (1 = Much lower than before, 4=The same as before 7=Much higher than before). Confirmatory factor analysis of two items of the mediator variable indicated satisfactory reliability and support to create one single measure of “Shopper perceived value of the shopping experience” since Cronbach's alpha supported the reliability for a single scale and ranged between 0.86 and 0.89 between the three studies.

Dependent Variable: Shopper Behavior Intention

We measured the dependent variable as a variable consisting of two sub-constructs: Retailer patronage intentions and Positive WOM intentions (Inman & Nikolova, 2017). Each sub-construct consisted of two questions measuring the expected change in shopper behavior as a result of using technology (a 7-point scale where 1 =Much lower than before, 4=The same as before 7=Much higher than before). All items measuring Shopper behavior intentions were loaded on one factor (factor loadings ranging from 0.88 to 0.92 across 3 studies), and confirmatory factor

analysis of four questions indicated satisfactory reliability. We averaged measures of Retailer patronage intention and WOM intention into a single measure of “Shopper behavior Intention” since Cronbach's alpha supported the reliability for a single scale and ranged between 0.91 and 0.93 across three studies.

Control variables

Confirmatory factor analysis of four items of the “Privacy Concerns” variable (with factors ranging from 0.92 to 0.97 loading across 3 studies) indicated satisfactory reliability and support to create one single measure of privacy concerns since Cronbach's alpha supported the reliability for a single scale ($\alpha=0.96$) for three studies. The scales and operationalization of the remaining shopper and technology control variables can be found in Appendix 2.

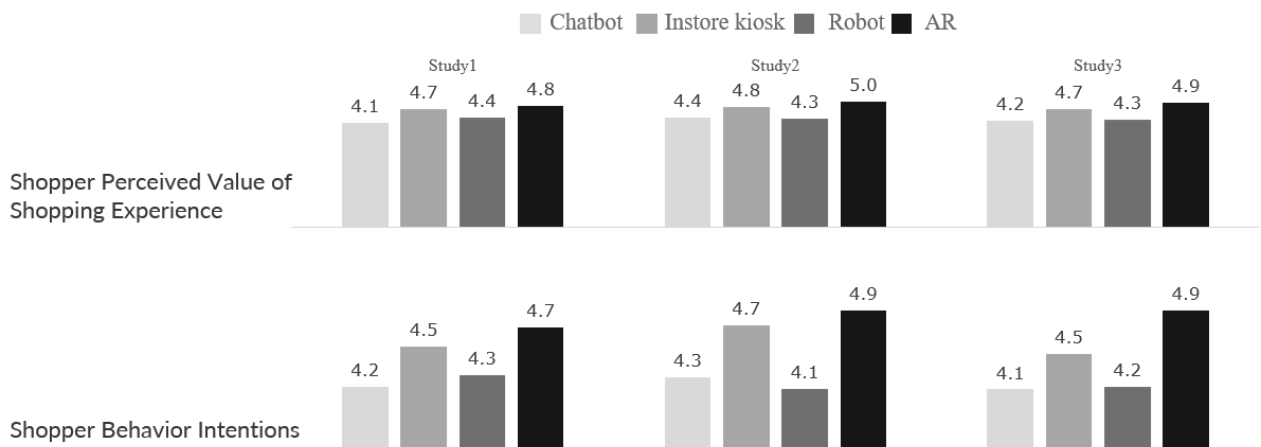
3.2.3. Analysis and Results

Descriptive Statistics

All analyses performed in Study 1 - Study 3 were done using Stata software. Before starting the analysis, we checked the variables for multicollinearity. The correlation between the independent variables did not suggest the presence of multicollinearity. The VIF statistics suggested that the highest correlation did not exceed coefficients of 1.44, which means that there was no multicollinearity between the independent variables. The residuals of dependent variables across all 3 studies had acceptable levels of skewness and kurtosis as well as bell-shaped distribution, therefore, it was assumed that the data had normal distribution, and OLS regression could be applied as a data analysis method.

The mean comparison of dependent variables across 3 studies revealed a similar pattern, where the means of Instore kiosk and AR technologies were higher than those of the Chatbot technology, while the mean comparison of Chatbot and Robot had mixed results.

Figure 3: Mean Comparison of the Main Variables



Method

We analyzed and reported the data obtained from three studies separately. In addition, since the studies had the same design, to evaluate the generalizability of hypotheses and test the robustness of the results across studies, we performed a meta-analysis by combining the data from all three studies.

To test hypotheses H1a, H1b, and H2 and check whether there was a difference in the impact between four technologies on the mediator variable of “Shopper perceived value of the shopping experience”, we used the OLS regression approach with robust standard errors. To analyze the total results, we used the OLS approach with fixed effect by study (by scenario) and with robust standard errors. Since the variable of “Shopper perceived value of the shopping experience” had no more than 13 values, as a robustness check, we have conducted a Poisson regression.

To test hypotheses H3a-H3c and check for mediation, we used the system of equations approach (OLS with robust standard errors for each of the studies and OLS with robust standard errors and a fixed effect for Total analysis). Since the data had categorical independent variables, the aim of the analysis was to test whether using Instore kiosk and Robot Assistant technologies made a significant positive

impact (relative to Chatbot) and a significant negative impact (relative to AR technologies) on the dependent variable “Shopper behavior intention” via the mediator variable of “Shopper perceived value of the shopping experience”.

To provide support for the mediation route, there are several conditions that need to be taken into consideration (Baron & Kenny, 1986):

- 1) Variations in levels of the independent variable should significantly account for variations in the presumed mediator (path a)
- 2) Variations in the mediator should significantly account for variations in the dependent variable (path b)
- 3) After the introduction of the mediator, a previously significant relation between the independent and dependent variables should not be longer significant (path c)

Therefore, we ran three equations for each Study to check whether the conditions were met and whether we had full or partial mediation. To check for the significance of the indirect effect, we used the bootstrapping (non-parametric resampling) technique. Therefore, to understand whether the relative indirect mediation effect was statistically significant, we ran the SEM analysis with the bootstrapping mediation approach with 10,000 bootstrap samples.

Results

Shopper Perceived Value of the Shopping Experience

To check for the difference between the impact of four different technologies while controlling for shopper and technology characteristics, OLS regression with robust standard errors was implemented (for Total model - OLS regression with robust

standard errors and fixed effect by Study). The results of the regressions are in Table 2.

As can be stated from the table, in comparison to Chatbot technology, both Instore kiosk and AR technology had a more positive and significant impact on “Shopper perceived value of the shopping experience” (the results of Study 2 had $p < 0.052$ values, but were statistically significant in Study 1, Study 3, and Total). However, the Robotic assistant technology had mixed and insignificant results.

When compared with AR technology, the Chatbot and Robotic assistant technologies had a significant negative impact in all studies. The difference between AR and Instore kiosk technologies lacked significance in Study 1, however, was negative and significant in Study 2, Study 3, and Total.

In addition, several control variables made a statistically significant impact on the variable of “Shopper perceived value of shopper experience”. Across all studies, “Ease of technology use” made a positive impact, while “Privacy concerns” made a negative impact on “Shopper behavior intentions”, both significant at $p < 0.001$ level.

Table 2. Main results of the impact of technologies on the Shopper Perceived Value of the Shopping Experience

	Base Technology: Chatbot				Base Technology: AR			
	Study1 (Fashion)	Study2 (Consumer Electronics)	Study3 (Furniture)	Total	Study1 (Fashion)	Study2 (Consumer Electronics)	Study3 (Furniture)	Total
Intercept	2.975(7.02)***	3.657(8.78)***	2.494(5.67)***	2.944(9.78)**	3.657(8.58)***	4.29(10.23)***	3.043(6.92)***	3.578(11.28)***
<i>Independent Variables</i>								
Chatbot					-0.682(-5.21)***	-0.633(-4.95)***	-0.55(-4.29)***	-0.634(-15.70)***
Instore kiosk	0.511(3.55)***	0.245(1.95)*	0.269(2.00)**	0.347(4.94)**	-0.171(-1.29)	-0.388(-3.13)***	-0.281(-2.06)**	-0.288(-5.65)**
Robotic assistant	0.205(1.34)	0.043(0.35)	0.15(1.14)	0.137(2.72)	-0.477(-3.50)***	-0.59(-4.85)***	-0.4(-2.88)***	-0.498(-8.39)***
AR	0.682(5.21)***	0.633(4.95)***	0.55(4.29)***	0.634(15.70)***				
<i>Technology Control Variables</i>								
Ease to use	0.267(5.24)***	0.257(5.76)***	0.323(6.03)***	0.286(17.07)***	.267(5.24)***	0.257(5.76)***	0.323(6.03)***	0.286(17.07)***
Novelty	-0.06(-0.78)	0.041(0.78)	0.007(1.29)	0.009(2.51)	-.06(-0.78)	0.041(0.78)	0.007(1.29)	0.009(2.51)
Privacy concerns	-0.124(-3.60)***	-0.191(-6.31)***	-0.1(-2.92)***	-0.136(-5.54)**	-.124(-3.60)***	-0.191(-6.31)***	-0.1(-2.92)***	-0.136(-5.54)**
<i>Shopper Control Variables</i>								
Gender: Male								
Gender: Female	0.04(0.40)	0.058(0.62)	0.185(1.89)*	0.09(2.17)	.04(0.40)*	0.058(0.62)	0.185(1.89)*	0.09(2.17)
Gender: Other	-0.048(-0.25)	-0.281(-0.99)	0.14(0.71)	-0.063(-0.46)	-.048(-0.25)	-0.281(-0.99)	0.14(0.71)	-0.063(-0.46)
Age	0.033(0.98)	0.042(1.02)	0.03(0.67)	0.057(2.83)	.033(0.98)	0.042(1.02)	0.03(0.67)	0.057(2.83)
Income	0.005(0.13)	-0.071(-2.26)**	0.013(0.36)	-0.024(-1.10)	.005(0.13)	-0.071(-2.26)**	0.013(0.36)	-0.024(-1.10)
Race: White								
Race: Black	0.134(0.42)	0.501(3.14)***	0.165(1.04)	0.319(2.39)	.134(0.42)	0.501(3.14)***	0.165(1.04)	0.319(2.39)
Race: Other	0.102(0.85)	0.229(1.93)*	0.147(1.31)	0.167(7.84)**	.102(0.85)	0.229(1.93)*	0.147(1.31)	0.167(7.84)**
Education	0.037(0.63)	0.042(1.01)	0.031(0.64)	0.023(7.84)***	.037(0.63)	0.042(1.01)	0.031(0.64)	0.023(7.84)***
Residence	0.02(0.25)	-0.05(-0.69)	-0.003(-0.04)	0.007(0.38)	.02(0.25)	-0.05(-0.69)	-0.003(-0.04)	0.007(0.38)
R ²	0.208	0.343	0.236	0.253	0.208	0.343	0.236	0.253
F-value	7.773***	13.656***	8.619***	-	7.773***	13.656***	8.619***	-
n	399	401	399	1199	399	401	399	1199

*p<0.1; **p<0.05; ***p<0.01. t-values are reported in parentheses.

All results of the robustness check (Poisson regressions) have supported the results of OLS regressions. Thus, the findings across 3 studies show that:

H1a - supported H1b - not supported. Even if the difference between Instore kiosk and AR lacked significance in Study 1, it was significant in Studies 2,3, and Total. In addition, the difference between AR and Robotic assistant was negative and significant in all studies. Therefore, we can conclude that H2 is supported.

Shopper Behavior Intention

The next step in our analysis was to understand whether there was a mediation route in the model. The results of the analysis in the previous section have suggested that using the Instore kiosk and AR made a statistically significant positive impact on the mediator when compared to Chatbot technology, and using Chatbot, Instore kiosk, and Robotic assistants made a statistically significant negative impact on the mediator when compared to AR (Table 3 Model 2). Results in Table 3 Model 1 also indicated that when not controlled for a mediator, the independent variables (Instore kiosk and AR) had a statistically significant positive impact on the dependent variable of “Shopper behavior intention” when compared to Chatbot (the only outlier is Study 3, where the impact of Instore kiosk lacks the significance), while all three technologies (Chatbot, Instore kiosk, and Robotic assistants) made a statistically significant negative impact when compared to AR. Additionally, as we can refer to from Model 3, the “Shopper perceived value of the shopping experience” made a statistically significant positive impact on “Shopper behavior intention”. Therefore, when controlled for the mediator:

- The impact of Instore kiosk (compared to Chatbot) on the dependent variable became insignificant or decreased in all cases. In Study 3, the original impact of the Instore kiosk on the dependent variable was not statistically significant, however, the indirect effect of mediation is significant. Mediation is confirmed.
- The impact of Chatbot (compared to AR) on the dependent variable became insignificant or decreased in all cases. Mediation is confirmed.
- The impact of Instore kiosk (compared to AR) on the dependent variable became insignificant or decreased in all cases but Study 1, where the impact

on the mediator was not statistically significant. Mediation is confirmed for the majority of cases.

- The impact of Robotic assistants (compared to AR) on the dependent variable became insignificant or decreased in all cases. Mediation is confirmed.

Table 3. Results of Mediation Analysis

	Study1			Study2			Study3			Total		
	Model 1 DV: Shop. behavior intention	Model 2 DV: Value of shop. exp.	Model 3 DV: Shop. behavior intention	Model 1 DV: Shop. behavior intention	Model 2 DV: Value of shop. exp.	Model 3 DV: Shop. behavior intention	Model 1 DV: Shop. behavior intention	Model 2 DV: Value of shop. exp.	Model 3 DV: Shop. behavior intention	Model 1 DV: Shop. behavior intention	Model 2 DV: Value of shop. exp.	Model 3 DV: Shop. behavior intention
Compared to Chatbot												
Intercept	2.76***	2.975 ***	0.658 **	3.52***	3.657 ***	0.709**	2.924***	2.494***	0.93***	2.888**	2.944**	0.649*
<i>Independent variables</i>												
Chatbot												
Instore kiosk	0.308**	0.511***	-0.053	0.299**	0.245*	0.11	0.177	0.269**	-0.038	0.273**	0.347**	0.009
Robotic assistant	0.079	0.205	-0.066	-0.043	0.043	-0.076	0.126	0.15	0.006	0.067	0.137	-0.037
AR	0.534***	0.682***	0.052	0.616***	0.633***	0.13	0.596***	0.55***	0.157**	0.602***	0.634***	0.119**
<i>Mediator</i>												
Value of shopping experience			0.707***			0.769***			0.8***			0.761***
R ²	0.211	0.208	0.705	0.362	0.343	0.755	0.219	0.236	0.679	0.246	0.253	0.701
F-value	7.444***	7.773***	37.137***	14.016	13.656***	73.462***	8.759***	8.619***	51.939	-	-	-
n	399	399	399	401	401	401	399	399	399	1199	1199	1199
Compared to AR												
Intercept	3.044***	3.506 ***	.582 **	4.137***	4.29***	0.838***	3.521***	3.043***	1.087***	3.49***	3.578***	0.768**
<i>Independent variables</i>												
AR												
Chatbot	-0.519***	-0.668***	-0.05	-0.616***	-0.633***	-0.13	-0.596***	-0.55***	-0.157**	-0.602***	-0.634***	-0.119**
Instore kiosk	-0.249**	-0.196	-0.111	-0.317***	-0.388***	-0.019	-0.419***	-0.281**	-0.195**	-0.329**	-0.288**	-0.11
Robotic assistant	-0.447***	-0.468***	-0.119	-0.659***	-0.593***	-0.205***	-0.471***	-0.4***	-0.151*	-0.535**	-0.498**	-0.157**
<i>Mediator</i>												
Value of shopping experience			0.702***			0.769***			0.8***			0.761***
R ²	0.22	0.22	0.71	0.36	0.34	0.76	0.22	0.24	0.68	0.246	0.253	0.701
F-value	8.055***	7.967***	36.711***	14.016	13.656***	73.462***	8.759***	8.619***	51.939***	-	-	-
n	399	399	399	401	401	401	399	399	399	1199	1199	1199

*p<0.1; **p<0.05; ***p<0.01

*Control variables are used in the analysis, but not included in the table

Thus, we confirmed all conditions of the mediation route (Baron & Kenny, 1986) for the majority of cases and concluded that there is a mediation.

The results of bootstrap analysis of the impact of Instore kiosk on “Shopper behavior intentions”, when compared to Chatbot technologies, revealed that the indirect effect of the mediation was significant in all studies except Study 2 and contributed to more than 65% of the total effect. In Study 2, the indirect effect was at the $p < 0.052$ level with normal confidence intervals. However, the bootstrapping with percentile and bias-corrected confidence intervals did not include zeroes, therefore the significance of the indirect effect can be accepted.

In the case of Instore kiosk compared to AR technology, the indirect effect of the mediation was significant in all studies at $p < 0.05$ level (except Study 1, where the significance of indirect effect was at $p < 0.01$ level) and contributed to 54-94% of the total effect.

The results of bootstrap analysis of the impact of Robotic assistant technologies on “Shopper Behavior Intentions”, when compared to AR technologies, revealed that the indirect effect of the mediation was significant in all studies ($p < 0.01$) and contributed to 68-74% of the total impact of the use of Robotic assistant on Shopper behavior intention in comparison to the AR technology.

Table 4. Results of SEM Bootstrapping Analysis

	Study1		Study2		Study3		Total	
	Coef.	P value	Coef.	P value	Coef.	P value	Coef.	P value
Compared to Chatbot								
Instore Kiosk								
<i>Direct effect (no mediation)</i>								
Instore Kiosk→ Shopper Behavior Intentions	-0.05	0.56	0.11	0.16	-0.05	0.60	0.01	0.86
<i>Indirect effect of mediation</i>								
Instore Kiosk→Percieved Shopping Value→Shopper Behavior Intentions	0.36	0.00	0.20	0.05	0.22	0.04	0.27	0.00
<i>Total effect</i>								
Instore Kiosk→Percieved Shopping Value→Shopper Behavior Intentions	0.31	0.01	0.31	0.01	0.17	0.24	0.27	0.00
Compared to AR								
Instore Kiosk								
<i>Direct effect (no mediation)</i>								
Instore Kiosk→ Shopper Behavior Intentions	-0.10	0.20	-0.02	0.81	-0.20	0.04	-0.11	0.02
<i>Indirect effect of mediation</i>								
Instore Kiosk→Percieved Shopping Value→Shopper Behavior Intentions	-0.12	0.09	-0.31	0.00	-0.21	0.05	-0.22	0.00
<i>Total effect</i>								
Instore Kiosk→Percieved Shopping Value→Shopper Behavior Intentions	-0.22	0.08	-0.33	0.01	-0.42	0.00	-0.33	0.00
Robotic Shopping Assistant								
<i>Direct effect (no mediation)</i>								
Robot→ Shopper Behavior Intentions	-0.12	0.10	-0.20	0.01	-0.16	0.08	-0.16	0.00
<i>Indirect effect of mediation</i>								
Robot→Percieved Shopping Value→Shopper Behavior Intentions	-0.34	0.00	-0.46	0.00	-0.32	0.01	-0.38	0.00
<i>Total effect</i>								
Robot→Percieved Shopping Value→Shopper Behavior Intentions	-0.46	0.00	-0.66	0.00	-0.47	0.00	-0.54	0.00

*Control variables are used in the analysis, but not included in the table

As a result of mediation analysis using Barron and Kenny as well as bootstrapping methods, it could be concluded that Instore kiosk makes a more positive and statistically significant impact than Chatbot, and AR makes a more positive and statistically significant impact than all other technologies on Shopper behavior intention via a mediating link through Shopper perceived value of the shopping experience.

Table 5. Study Results

	Study1	Study2	Study3	Total
<i>Hypothesis 1a</i>	Yes	No (p value=0.052)	Yes	Yes
<i>Hypothesis 1b</i>	No	No	No	No
<i>Hypothesis 2</i>	Partially	Yes	Yes	Yes
<i>Hypothesis 3a</i>	Yes	Yes	Partially	Yes
<i>Hypothesis 3b</i>	No	No	No	No
<i>Hypothesis 3c</i>	Partially	Yes	Yes	Yes

To sum up the overall results, despite the different shopping scenarios, the perception of technologies by shoppers had similar trends. As a result, hypothesis H1a is supported (even though the p-value in Study 2 is slightly higher than the acceptable p-value threshold), hypothesis H2 is mainly supported (in Study 1, the difference between AR and Instore kiosk is not statistically significant, but statistically significant between AR and Robotic assistant), hypothesis H3a is supported (in Study 3 the total effect is not significant, but the indirect effect of mediation is statistically significant), H3c is mainly supported (In Study 1, the total and indirect effects of difference between AR and Instore kiosk have p=0.08 and p=0.09 values, but the difference between AR and Robotic assistant is statistically significant). H1a and H3b are not supported.

4. Discussion

According to Pre-Study results, the majority of the tested technologies provided usefulness for shoppers and were located in the High Usef./Low Eng. quadrant. There were just a few technologies that provided engagement benefit only. As could be suggested from the Pre-Study results, Chatbots and Instore video calls were the least appreciated technologies that provide both low usefulness and low engagement. On the other hand, Augmented reality and Smart mirrors were the

most appreciated technologies that provide both benefits and are located in the High Usef./High Eng. corner.

To understand how using the technologies providing a different combination of usefulness vs. engagement translates into shopper behavior, Study 1-Study 3 were conducted. According to the results of studies, four technologies tested (Chatbot=Low Usef./Low Eng., Instore kiosk=High Usef./Low Eng., Robotic assistants=Low Usef./High Eng., and AR=High Usef./High Eng.) made different impacts on the Shopper perceived value of the shopping experience and Shopper behavior intentions, with Low Usef./Low Eng. Technology (Chatbot) having the lowest impact, while High Usef./High Eng. Technology (AR) having the highest impact.

Contrary to previous research, our study shows that technology that provided engagement only (Low Usef./High Eng.) did not have a significant impact on either the Perceived value of the shopping experience or Shopping behavior intentions when compared with technology that is low on both benefits (Low Usef./Low Eng.). On the other side, technologies that provided high usefulness (High Usef./Low Eng.) made a significant impact on the Shopper perceived value of the shopping experience and Shopper behavior intentions when compared with technology that is low on both benefits (Low Usef./Low Eng.). It can be concluded that rational aspects of technologies are crucial and, first of all, retail technologies need to provide usefulness to shoppers. However, even if engagement did not make a significant impact on the Shopper value of the shopping experiences and Shopper behavior intention on its own, in combination with usefulness, it brought higher value to shoppers, as it was supported in Study 1 - Study 3, where High Usef/High Eng. Technology had a more statistically significant positive impact on dependent

variables when compared to all other types of technologies (Low Usef./Low Eng.; High Usef./Low Eng.; Low Usef./High Eng.).

It is important not to undervalue the impact of other features of technologies. As suggested in the previous literature, shoppers are more likely to have a positive attitude toward technology and, as a result, a more positive value of the shopping experience, if the technology is easy to use and generates fewer privacy concerns. Therefore, difficulty to use and high privacy concerns associated with technology might be perceived as costs that can undermine any potential benefits provided by technology. Just like in previous academic research, our study supported the claims that Privacy concerns and Ease of use associated with technology make a statistically significant impact on the Shopper perceived value of the shopping experience and Shopper behavior intentions; therefore, retailers need to be aware of these features when implementing new technological innovations in their strategies. As was suggested from the mediation analysis, the positive impact of Instore kiosk and AR technologies (relative to Chatbot) on the dependent variable and the negative impact of Chatbot, Robot, and Instore kiosk technologies on dependent variables (relative to AR) was mediated by the Shopper perceived value of the shopping experience. Therefore, increasing the Shopper perceived value of the shopping experience is a crucial strategy for retailers, which they can do by increasing the shopper benefits obtained during the shopping process.

The findings of our research support the original claim that before the implementation of shopper-facing technologies, retailers need to understand how these technologies affect the shopper perceived benefits and shopper behavior intentions. In our study, we demonstrated that the shopper perceived value of the shopping experience is impacted by the interlink of usefulness vs. engagement

benefits that the technology delivers to shoppers. We provided support to the proposed Usefulness vs. Engagement framework by testing several technologies from different quadrants of the framework on shopper behavior intentions. The findings showed that shopper behavior intentions are affected by shopper benefits that technologies provide, with technologies providing both usefulness and engagement making the strongest impact on shopper behavior intentions, mediated by the perceived value of the shopping experience.

In sum, the results of our study suggested that by assessing the technologies by usefulness vs. engagement and evaluating them by the ease of use and potential privacy concerns, retailers can create higher shopper perceived value of the shopping experience and shopper behavior intention such as retailer patronage and WOM, which are crucial for increasing retailer revenues. Also, retailers can try to change the shoppers' perceptions of technologies and try to move the technologies located in the Low Usef./High Eng. quadrant into the High Usef./High Eng. quadrant by increasing the shoppers' perceptions of the usefulness of those technologies. This can be achieved by educating shoppers or providing the proper experience and environment to make them perceive these technologies not only as engaging but also as useful. Alternatively, retailers' strategies can focus on moving the shoppers' perceptions of technologies located in the High Usef./Low Eng. quadrant into the High Usef./High Eng. quadrant by increasing the shoppers' perceptions of engagement of those technologies which could be reached by altering some features of technology and making it more entertaining, viral, and enjoyable to use. However, apart from focusing on the benefits of technologies, retailers also need to ensure that these technologies come with lower time and cognitive costs while being easy to use and generating a low level of privacy concerns.

5. Conclusions and Limitations

Increased digitalization and the growth of technological innovations created many new opportunities for retailers to enhance the customer shopping experience with the use of technologies. In our study, we proposed a 2x2 framework with a categorization of technologies by benefits (usefulness vs. engagement) provided at the pre-purchase stage of the shopper journey. We argued that higher usefulness or higher engagement provided by technologies at the pre-purchase stage will result in a better perception of the experience during the overall shopper journey, which converts into more positive shopper behavior in the forms of retailer patronage and positive WOM created.

Despite the strong study design, we believe that our research has several limitations, which offer opportunities for further research. First, the research results need to be tested for generalizability. In our research, we checked only 4 technologies from different quadrants of the Usefulness vs. Engagement framework. Apart from the benefits provided, there could be particular features of technologies not covered in our study that could impact shopper perceived value of the shopping experience and shopper behavior. As a suggestion for further research, studying other technologies using the same framework would be beneficial. Second, we conducted a survey asking participants to imagine the use of technologies, while experiencing the technologies during the actual shopping could have a slightly different impact on the shopping experience. For example, according to Peukert et al. (2019), the hedonic aspects of shopping are scored much higher when experienced in the shopping environment vs. simply imagining. A suggestion for future research is to conduct a survey of shoppers at the retailer settings right after using the technologies. This will help to collect more reliable data in the actual shopping scenario. Finally, another opportunity for future research is to collect sales data from retailers after the

implementation of the technologies. Combining survey data with actual sales data can provide a better understanding of the impact of the use of technologies on retailer operations.

In conclusion, we believe that our study contributes both to academic research and to industry professionals. This research makes a theoretical contribution by advancing the understanding of retail technologies through the development of a novel 2x2 framework that classifies these technologies based on their usefulness and engagement benefits. Unlike previous studies that often focused on individual technologies, this research expands the scope by analyzing the combined effects of multiple technologies with varying levels of these two dimensions. The findings challenge existing assumptions by showing that engagement alone does not significantly impact shopper behavior unless paired with usefulness, thereby underscoring the primacy of functional benefits in retail technology adoption. By demonstrating the interrelationship between usefulness, engagement, and shopper outcomes, this research contributes to the broader literature on technology acceptance and shopper behavior, offering a robust theoretical foundation for future studies on technology adoption in retail environments.

Additionally, this research provides practical guidance for industry players, especially retailers, by offering a clear framework for understanding how various retail technologies impact shopper behavior. By utilizing this framework, retailers can make informed decisions when selecting technologies that align with their strategic goals, whether that's providing convenience for shoppers, boosting customer engagement, or driving sales. Furthermore, the research emphasizes the need for technologies to be easy to use and address privacy concerns, helping retailers improve shoppers' perception of technologies and retail innovations. Ultimately, this

research equips industry professionals with actionable insights to optimize technology investments and create more valuable, engaging shopping experiences.

In an era of increased digitalization, this research equips academics and industry participants with knowledge about the impact of retail technological innovations on shoppers' behavior. It adds valuable inputs to research on the topic of "Shoppers and Retail Technologies", as well as helps retailers strategically select and implement technologies that align with their objectives and ultimately improve customer retention, engagement, and sales.

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APPENDICES

Appendix 1: Pre-study Description of Technologies

1) **Instore kiosk** - the small, freestanding unit located within a store on the sales floor that displays information to shoppers as they walk by. This could be information about the products available, detailed product information, location of the product, current promos, or any other relevant information. Shoppers can view information and make a purchase in-store or online.

2) **Salesforce equipped with tablets** - help the shoppers to build a digital PERSONALIZED shopping experience while being in the offline store. The sales assistant identifies the shopper (through the shopper application or loyalty card) and with help of special software installed on the tablet helps the shopper to find the information about the product, compare prices, find promos, and help with the decision-making process.

3) **Virtual Reality** - a VR headset, wearing of which allows the shopper to enter a three-dimensional virtual world. VR can be used to make the shoppers imagine the features of the product or how the product will look in different environments.

4) **Augmented Reality** - Online application that helps shoppers visualize how the item will look in their setting (for example, you can take a picture of yourself and see how the dress/suit will look at you in different colors, styles, etc.).

5) **Instore Digital Signage** - receiving personalized advertisements and promos on the in-store digital screens while passing them in-store. Digital signage systems have equipped cameras that identify consumers' characteristics (such as demographic data, mood, etc.).

6) **Robotic Shopping assistant** - Robots (static or mobile), usually located at the door or aisle entrances, that could provide prices, aisle guidance, product information, and other information.

- 7) **Instore Video calls** - video calls, that allow shoppers while being at home, to connect with an in-store shopping assistant who can show shoppers products live, in real-time, at any angle.
- 8) **Instore QR codes** - QR codes used in-store that, when scanned, provide detailed product information, promos, etc.
- 9) **Retailer application** - a retail application that provides detailed product information, personalized recommendations, product availability, product aisle location, and personalized promotions. Shoppers can view information and make instantly make an online purchase.
- 10) **Online chatbots/virtual assistants** - online software that simulates human-like conversations with users via text messages on chat.
- 11) **Instore digital map of the store** - a smartphone application or terminal on the entrance of the store that provides optimized routing for shoppers to find the desired item and navigate store layouts efficiently.
- 12) **Check-in function to be served** - check-in function via retailer application or scanning the barcode that allows shoppers to notify the sales assistants that they arrived in the store. After the shopper's check-in, the sales assistant (who through the shopper's check-in obtained access to the shopper's previous purchases info via the CRM system) approaches the shopper to provide customized service.
- 13) **Interactive smart mirrors** - mirrors that have a built-in 3D camera that takes an accurate full body scan, from which the shopper can create a lifelike avatar of themselves. You can then browse products in the mirror and see exactly how your dress/suit will actually look and fit your body. Additionally, you also can take a selfie and share it on social networks.

Appendix 2: Study 1 - Study 3 Variables, Measures, and Operationalization

Construct	Sub-Construct	Question
Shopper Perceived Value of the Shopping Experience Adapted from Inman & Nikolova, 2017		Please, rate how you agree with the following statements. (1=Much lower than before, 4=The same as before 7=Much higher than before) -What will be the value of your overall shopping experience after using this technology? -Compared to what you have to give up (time and effort), what would be the overall ability of the retailer to satisfy your wants and needs after using this technology?
	Retailer patronage intentions Adopted from Inman & Nikolova, 2017	Please, rate how you agree with the following statements. (1=Much lower than before, 4=The same as before 7=Much higher than before) -My willingness to purchase from this retailer would be..... as a result of the use of this technology. -My willingness to visit this store in the future would be..... as a result of the use of this technology
Shopper Behavior intentions Adopted from Inman & Nikolova, 2017	WOM intentions Adopted from Inman & Nikolova, 2017	-My willingness to recommend this retailer to my relatives and friends would be.....as a result of the use of this technology. -My likelihood of saying good things about this retailer to my relatives and friends would be...as a result of the use of this technology
	Ease of use	Please, rate the technology that you have used. Please, rate how you agree with the following statement. (1=Strongly disagree, 7=Strongly agree) -This technology will be easy for me to use
Technology Variables	Privacy concerns Adapted from Grosso et al., 2020	-During the use of this technology, I will have a concern that the retailer collects too much personal information about me -During the use of this technology, I will have a concern that unauthorized people could access my personal information collected by the retailer -During the use of this technology, I will have a concern about the accuracy of my personal data in the retailer's database -During the use of this technology, I will have a concern that the retailer can use my personal information for other purposes
	Novelty of use	How frequently you have used this retailer technology before? (1=Never, 5=Always)
	Gender	Please, identify your gender. i) Female j) Male k) Non-binary /third gender l) Prefer not to say
Shopper Variables	Age	Please, identify your age. a) Younger than 25 b) 25-34 c) 35-44 d) 45-54 e) 55-and older
	Income	Which of these describes your personal income last year? a) \$0 b) \$1 to \$ 9 999 c) \$10 000 to \$ 24 999 d) \$25 000 to \$ 49 999 e) \$50 000 to \$ 74 999 f) \$75 000 and greater g) Prefer not to answer
	Education	Please, identify your highest achieved level of education. a) Not completed High School b) High school

	<ul style="list-style-type: none"> c) Technical college d) Bachelor's degree e) Master's degree and higher
Race	<p style="text-align: center;">Choose one race that you consider yourself to be</p> <ul style="list-style-type: none"> a) White or Caucasian b) Black or African American c) American Indian/Native American or Alaska Native d) Asian e) Hispanic, Latino, or Spanish origin f) Middle Eastern or North African g) Native Hawaiian or Other Pacific Islander h) Other i) Prefer not to answer
Residence	<p style="text-align: center;">Which of the following best describes the area you live in?</p> <ul style="list-style-type: none"> a) Urban b) Suburban c) Rural

CONCLUSION

The overarching aim of this dissertation was to explore how emerging technologies in both physical and virtual retail spaces impact shopper behavior and the mechanisms driving these effects. By combining theories of self-extension, symbolic consumption, and technology acceptance with rigorous qualitative and quantitative methods, this research provides a comprehensive overview of how technological innovations influence shopper experiences and behavior in the evolving retail landscape.

Each chapter contributes uniquely to the overall objective by investigating distinct areas that shape shopper behavior within virtual and physical retail spaces.

Chapter 1 focused on shopping in the metaverse and examined the characteristics of metaverse platforms that drive virtual consumption. In this chapter, I looked at virtual consumption through the lens of self-extension and symbolic consumption theories, where the social context is crucial. The research revealed that platform characteristics, such as sociability, ease of use, and ease of making a purchase, along with the virtual product characteristics, such as the emotional and social value of virtual products, significantly impact users' purchasing intentions. This chapter contributes to academia by not only consolidating current research on virtual consumption into one comprehensive framework and testing the most significant factors impacting virtual consumption but also by adding a new angle that applies the use of self-extension and symbolic consumption theories and emphasizes the importance of social context in metaverse environments—a previously undervalued factor in academic literature. The insights provided are highly relevant for industry

practitioners designing metaverse platforms and virtual goods, as they outline effective strategies for enhancing user engagement and driving revenue.

Chapter 2 continued to study the phenomenon of shopping in the metaverse using self-extension and symbolic consumption theories but investigated the role of avatars in shaping virtual consumption. By using a multi-method approach consisting of interviews, projective techniques, and surveys of the metaverse users, it revealed that higher levels of avatar identification, driven by choosing certain self-representation strategies, user motivations, and the metaverse world characteristics, lead to increased intentions to purchase virtual goods as a means of self-expression and enjoyment expected to be obtained. This chapter fills a critical research gap by establishing a link between avatar identification and virtual consumption, previously unexplored in academic literature. For industry professionals, in addition to findings from Chapter 1, this research demonstrates that, apart from platform and product characteristics, to drive virtual purchases in the metaverse, companies need also consider avatar design characteristics and provide opportunities for users to develop avatar identification.

Chapter 3 addressed shopping in the physical retail space and investigated how the use of shopper-facing retail technologies at the pre-purchase stage impacts shopper behavior intention. By developing a novel 2x2 framework that categorizes retail technologies based on their usefulness and engagement benefits, the research identified the impact of different usefulness/engagement interlinks and mechanisms through which these technologies impact shopper behavior. Contrary to previous academic research, this chapter demonstrated that engagement alone is insufficient to shape shoppers' behavior. It also demonstrated that, while the usefulness of technologies is a crucial benefit appreciated by shoppers, the combination of

usefulness and engagement offers the best value proposition to them. This chapter advances academic understanding of technology adoption by providing a broader comparative perspective, and it offers practical value to retailers by providing them with a comprehensive framework that can guide in the strategic selection of technologies that align with business objectives, customer value propositions, and sales objectives.

The main limitation of this dissertation is that despite its strong methodology, it measures only attitudes, perceptions, and behavior intentions. Therefore, research based on observational data obtained from actual user/shopper behavior could benefit academic research on the topics discussed.

Nevertheless, this dissertation makes an academic contribution by synthesizing theories from virtual and physical retail domains and expanding knowledge on shopper behavior in technology-mediated environments. Moreover, each chapter not only adds depth to the academic literature on the impact of retail technologies in physical and virtual consumption but also provides industry professionals with valuable frameworks and strategies to enhance shopper experiences and improve revenue outcomes in the technology-shaped retail landscape.