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MASTER'S THESIS

AN ANALYSIS OF FEELINGS EVOKED BY METAVERSE FASHION

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AUTHORSHIP STATEMENT

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LIST OF ABBREVIATIONS

AI	Artificial Intelligence
AR	Augmented Reality (AR)
NFT	Non – fungible token
VR	Virtual Reality

1 INTRODUCTION

Computer Science innovations play a major role in everyday life as they change and enrich human interaction, communication and social transactions. From the standpoint of end users, three major technological innovation waves have been recorded centered around the introduction of personal computers, the Internet and mobile devices, respectively. Currently, the fourth wave of computing innovation is unfolding around spatial, immersive technologies such as Virtual Reality (VR) and Augmented Reality (AR). This wave is expected to form the next ubiquitous computing paradigm that has the potential to transform (online) education, business, remote work and entertainment. This new paradigm is the Metaverse. The word Metaverse is a closed compound word with two components: Meta (Greek prefix meaning post, after or beyond) and universe. In other words, the Metaverse is a post-reality universe, a perpetual and persistent multiuser environment merging physical reality with digital virtuality. Regarding online distance education, Metaverse has the potential to remedy the fundamental limitations of web-based 2D e-learning tools (Mystakidis, 2022). Metaverse can be regarded as a virtual world that is both parallel to the real one and interacts with it. It resides in a virtual space that mirrors the natural world, and is independent of the real world. A digital virtual human is an element used by an individual in the real world to move freely in the Metaverse (Mu et al., 2021).

Therefore, the Metaverse is a system of independent, durable multiuser platforms that house social, networked, immersive environments. It makes it possible for users to communicate and engage with digital artifacts in a fluid, bodily manner in real time. In its original form, it was a network of interconnected virtual worlds where users' avatars could freely move around. Social, immersive VR platforms that work with Massively Multiplayer Online games (MMOs), open game worlds, and augmented reality (AR) collaborative spaces are a hallmark of the modern incarnation of the Metaverse. The Metaverse refers to a collection of virtual reality platforms that are designed to be social and immersive. These platforms are compatible with various forms of online gaming, including massively multiplayer online games, as well as open game environments and augmented reality collaborative spaces (Wang et al., 2022).

According to Periyasami and Periyasamy (2022), the Metaverse enables users to build personalized avatars and explore diverse virtual environments while connecting with others, fostering a heightened sense of immersion compared to traditional media experiences. This immersive interaction also creates new opportunities for businesses, allowing them to engage directly with consumers through avatars, thereby bypassing conventional marketing channels

such as print and television advertising. As users increasingly interact through personalized avatars, companies are beginning to design immersive marketing experiences that integrate gamification elements to boost consumer engagement and brand loyalty (Peterson & Saker, 2023).

The idea of the Metaverse extends an existing concept, that of second life. Second life is a multiplatform online community in which users create avatars and essentially have a “second life” instead of their primary life in the real world (Tidy, 2021). Virtual humans, also referred to as digital avatars or synthetic beings, play a central role in shaping user interaction and identity within the Metaverse (Lee et al., 2024). These entities are created using advanced AI and 3D modeling techniques to simulate human appearance, behavior, and emotion (Zhao et al., 2022). They serve as personal representations or autonomous agents, facilitating communication and social presence in immersive digital environments (Bailenson, 2018). The development of lifelike virtual humans has been significantly accelerated by improvements in motion capture, facial tracking, and natural language processing technologies (Cai et al., 2022). In retail and fashion contexts, virtual humans are increasingly employed as models, influencers, and sales assistants, enhancing brand engagement and consumer personalization (Park & Kim, 2022). Despite their benefits, challenges remain regarding ethical considerations, emotional authenticity, and the psychological effects of interacting with AI-driven avatars (Westerman et al., 2023). Their adoption raises fundamental questions about what it means to be human in virtual contexts and how digital identities are constructed and perceived (de Borja & Rodriguez, 2021).

The Metaverse allows for seamless navigation and interaction due to the immersive environments it offers, enhancing the overall user experience. Baek (2023) notes that the spatial organization and interactivity of virtual worlds are crucial in shaping user flow and immersion. In retail contexts, intuitive design and technological ease reduce friction for users, encouraging deeper engagement. Ahmad et al. (2023) emphasizes that user-friendly interfaces and smooth transitions between platforms within the Metaverse contribute to increased consumer satisfaction and retention. These enhanced virtual experiences influence how users cognitively and emotionally process information. Chen et al. (2023) point out that artificial intelligence in digital fashion supports this by delivering personalized experiences that align with user preferences, thereby deepening involvement. Furthermore, Anuar and Jumrah (2023) assert that the integration of fashion into the Metaverse ranges from casual wear to high-end design, enabling a diverse range of expressions that transcend physical constraints. The Metaverse enables brands to craft immersive, interactive experiences that engage users across emotional and cognitive dimensions, redefining consumer interaction in virtual spaces (Carter & Egliston, 2023; Chalmers, 2022).

By offering immersive, emotionally resonant, and contextually rich environments, the Metaverse enables brands to evoke complex consumer responses ranging from emotional attachment to heightened engagement through virtual fashion experiences (Tian & Delgado, 2023; Turner & Sakamoto, 2023). These environments simulate real-world interactions and allow for the personalization of digital garments, which can influence users' emotional and cognitive states. As a result, the concept of brand experience in the Metaverse is evolving to include affective computing and emotional tailoring, deepening the connection between virtual strategies and brand equity (Turner & Sakamoto, 2023).

In the Metaverse, fashion transcends physical limitations, allowing users to experiment with endless outfit combinations through digital avatars (Lee, 2022). Unlike traditional retail environments, virtual try-on technology enables consumers to visualize garments in real time without visiting physical stores (Park & Kim, 2021). This immersive experience is supported by advancements in 3D modeling and augmented reality, enhancing the realism of digital clothing (Wang et al., 2020). Virtual fashion also allows users to instantly switch outfits according to different contexts, from gaming to social events, offering unparalleled convenience (Ranjan & Read, 2022). Moreover, the application of AI in fashion personalization is revolutionizing how individuals choose and interact with digital garments (Chen et al., 2023). The core goal of virtual try-on is to evaluate how clothes appear on the user without requiring them to physically change, increasing efficiency and user satisfaction (Mu et al., 2021).

Shopping has increasingly become an experience rather than a mere transaction, particularly for Generation Z, who seek emotional and interactive engagement during their purchases (Francis & Hoefel, 2018). The integration of AR into retail environments has begun to meet these experiential expectations by allowing virtual try-ons and immersive product exploration (Poushneh, 2018).

Gen-Z consumers actively use technology as a natural extension of themselves, approaching digital tools with fluency and intuition (Turner, 2021). Despite their digital savvy, they remain anchored in their values, including sustainability and ethical production (Rissanen & Laitala, 2023). Their sharp influence on consumption culture stems from their deep self-awareness and deliberate decision-making processes (Williams et al., 2021). As true digital natives, they use the internet and technology more effectively than previous generations to research, compare, and make informed purchase decisions (Park & Kim, 2022). Consequently, they demonstrate loyalty primarily to brands that align with their expectations and beliefs, particularly in terms of authenticity and social impact (Peterson & Saker, 2023). However, this loyalty is conditional and fragile Pereira, Davvetas, and Marder (2023) found that brand perception in virtual environments is strongly influenced by user experience and

design. This highlights their high standards and low tolerance for failure, emphasizing the importance of delivering seamless experiences (Periyasamy & Periyasami, 2023).

In everyday language, emotions are any relatively brief conscious experiences characterized by intense mental activity and a high degree of pleasure or displeasure. In scientific research, a consistent definition has not been found yet. There is certainly conceptual overlaps between the psychological and neuroscientific underpinnings of emotions, moods, and feelings (iMotions, 2017).

As the foregoing formulation suggests, the neurobiological processes involved in emotions generate conscious experiences of feelings, much like how sensory input creates perceptual experiences. In immersive virtual environments, these emotional responses are increasingly relevant, as users engage with digital fashion and avatars in ways that evoke real psychological and affective reactions (Maples-Keller et al., 2017). The sensory and emotional dimensions of virtual fashion are further enhanced through affective computing, which enables garments and environments to respond to users' emotional states, deepening the sense of presence and reflective engagement (Turner & Sakamoto, 2023). Emotions are closely linked to physiological and psychological arousal with various levels of arousal relating to specific emotions. In neurobiological terms, emotions could be defined as complex action programs triggered by the presence of certain external or internal stimuli.

Facial expressions are only one out of many correlates of emotion, but they might be the most apparent ones. Humans are obviously able to produce thousands of slightly varying sets of facial expressions however, there is only a small set of distinctive facial configurations that almost every one associates with certain emotions, irrespective gender, age, cultural background and socialization history (iMotions, 2017).

Emotions are complex psychological phenomena that have been studied extensively across various disciplines, including psychology, neuroscience, and anthropology. From a psychological standpoint, emotions encompass a range of subjective experiences, physiological responses, and behavioral expressions. Researchers like Paul Ekman have proposed the existence of basic emotions universal emotional states such as joy, anger, fear, sadness, disgust, and surprise that transcend cultural boundaries (Ekman, 1992). Emotion feeling, like any other neurobiological activity, varies from low to high levels of intensity. The autonomic nervous system may modulate the emotion feeling but does not change its quality or valence (Tomkins, 1962).

Neuroscientific investigations have shed light on the neural substrates of emotions. Antonio Damasio, in his influential work "Descartes' Error," explores the intricate interplay between

emotions and reason, emphasizing the crucial role of emotions in decision-making and social functioning (Damasio, 1994). According to Damasio, emotions are integral to the processes of cognition, guiding adaptive behavior in response to environmental stimuli. Cultural influences on emotions have been extensively studied as well. Researchers such as Batja Mesquita and Nico Frijda have highlighted the variability of emotional experiences across cultures, emphasizing that emotions are not only universal but also culturally shaped constructs that reflect societal norms and values (Mesquita & Frijda, 1992).

From an evolutionary perspective, emotions are considered adaptive responses that have evolved to serve specific functions. The work of John Tooby and Leda Cosmides delves into the evolutionary psychology of emotions, proposing that emotions are mechanisms shaped by natural selection to solve specific problems related to survival and reproduction (Tooby & Cosmides, 2008). The particular quality of each discrete emotion feeling evolved because its effects on other senses, cognition, and action are generally adaptive (Edelman & Tononi, 2000).

The objective of this master's thesis is to explore emotional engagement with virtual fashion in the Metaverse using biometric measurements specifically Facial Expression Analysis combined with semi-structured interviews. The study will involve 20 participants, all of them is in their twenties and students at master program, selected through convenient sampling, as permitted by the neuro-behavioral lab at the University of Sarajevo – School of Economics and Business. This approach ensures a broader perspective and supports the validity of neuro-behavioral research with small samples (e.g., Elliot, 1968).

Each participant will view a standardized video stimulus lasting one minute, showcasing a virtual fashion exhibition featuring models and clothing in the Metaverse. The use of video, rather than static images, aims to immerse participants in a realistic digital fashion experience, capturing both initial reactions and evolving emotional responses. Facial expressions will be recorded and analyzed using iMotions software (iMotions, 2017), which identifies emotions such as surprise, joy, disgust, and sadness. Emotional intensity is measured on a scale from 0 to 100, with the most dominant emotion at any moment considered primary. Participants may express multiple emotions simultaneously, and temporal variations will be tracked throughout the video. Following the viewing, participants will engage in semi-structured interviews to provide qualitative insights into their emotional reactions and perceptions. This mixed-method approach allows for a deeper understanding of how individuals respond to digital fashion, including patterns of adaptation, resistance, or rejection.

The study also aims to explore how age and technological familiarity influence acceptance of Metaverse fashion. Including participants both significantly younger and older than 20, as well as those with varying attitudes toward technology, will help assess emotional engagement across a more diverse spectrum.

Through the application of selected research methods, this study aims to provide answers to the defined research questions:

RQ1: Is the Metaverse already well-defined, or is it still unclear what it is and what it's used for?

RQ2: Do respondents alter their feelings after viewing the content?

RQ3: What specific emotional responses do participants experience when viewing virtual fashion shows in the Metaverse?

RQ4: How do emotional reactions to fashion in the Metaverse differ based on the participants' age and professional background?

The thesis is structured into several main chapters, each designed to provide a comprehensive understanding of the research topic. It begins with an Introduction, followed by three core chapters: Metaverse, Fashion in the Metaverse, and empirical analysis. Each of these chapters contains subchapters that further elaborate on specific aspects, helping to clarify and deepen the conceptual framework of the study. The final chapter presents the conclusion, which summarizes the key findings, discusses implications, and offers recommendations for future research. This structure ensures a logical flow and supports a thorough exploration of emotional engagement with fashion in the Metaverse.

2 FASHION

2.1 Definition of fashion

Fashion is a pervasive and dynamic aspect of human culture that influences not only what people wear, but also how they express identity, status, values, and group affiliation. It is more than clothing or trends; it is a social phenomenon embedded within cultural, economic, psychological, and historical contexts (Crane, 2000; Entwistle, 2000).

Fashion is a cultural phenomenon shaped by social, political, and economic forces, and its meaning evolves over time as these forces shift (Craik, 1993). Rather than being a fixed concept, fashion is dynamic and fluid, reflecting broader societal transformations and symbolic systems (Entwistle, 2000). Vinken (2005) emphasizes that fashion operates through

cycles and trends that echo the zeitgeist of a given era. According to Kawamura (2005), fashion must be distinguished from mere clothing; while clothing is a tangible object, fashion is a symbolic and institutional system that gives clothing social meaning. Barnard (2002) supports this distinction by arguing that fashion is embedded in representation and identity, influenced by a complex interplay between media, consumer behavior, and cultural expression. Fashion is composed of diverse components such as garments, accessories, and body adornments that function as visual markers within a cultural and social framework, communicating messages about identity, status, and belonging (Craik, 1993). Fashion in digital environments continues to serve as a dual mechanism of self-expression and social alignment, where users simultaneously seek uniqueness and community through customizable and immersive fashion experiences (Gupta & Gentry, 2022; Cruz & Tomlinson, 2023).

Sociological perspectives on fashion emphasize its role in balancing individuality and social belonging. Gupta and Gentry (2022) argue that virtual fashion enables users to express unique identities while simultaneously aligning with group norms and digital subcultures, highlighting the dual function of fashion as both a tool for differentiation and conformity. This duality makes fashion inherently social, as it is constantly negotiated through group dynamics, media, and institutional frameworks (Gupta & Gentry, 2022). Barnard (2002) extends this argument by suggesting that fashion is a form of visual communication. Clothing and appearance convey meanings and narratives that are interpreted within specific cultural contexts (Barnard, 2002). In this view, fashion becomes a language through which identity, gender, class, and other social constructs are expressed and contested (Barnard, 2002). Fashion is often conceptualized along a spectrum that ranges from luxury to everyday or mass fashion, reflecting differences in production, consumption, and cultural significance. Luxury fashion is characterized by exclusivity, high-quality craftsmanship, premium pricing, and symbolic value, often serving as a marker of status and identity (Kapferer & Bastien, 2012; Veblen, 1899). It includes haute couture and high-end designer brands, operating on principles of scarcity and brand heritage (Kawamura, 2005).

The most comprehensive definition and explanation of luxury are provided by Vigneron and Johnson (1999, as cited in Husić-Mehmedović, 2020). They argue that the consumption of luxury products serves as a symbol of status and wealth, and their price, which is high by ordinary standards, enhances the value of that signal (perceived conspicuous value). Furthermore, if virtually everyone possessed a certain product, by definition, it would no longer be considered a luxury item (perceived unique value). Additionally, the role of luxury products and their social value can be decisive when making a purchase decision; for instance, appearance clearly influences product choice (perceived hedonic value).

Nevertheless, luxury is also partly derived from technical superiority and extreme attention to detail during the production process (perceived perfectionist value).

Mass-market fashion is characterized by affordability, accessibility, and rapid responsiveness to current trends, enabling broader public participation in fashion consumption (Periyasami & Periyasamy, 2022). Brands like Zara and H&M have built scalable models that replicate runway styles quickly and economically, reflecting the industry's shift toward digitized and consumer-driven production (Periyasamy & Periyasami, 2023). This segment of fashion emphasizes availability and trend adaptation over exclusivity or craftsmanship, providing consumers with opportunities for frequent wardrobe changes and identity expression (Miller & Park, 2023). Meanwhile, scholars note that fashion operates along a spectrum where luxury goods represent status and exclusivity, while everyday fashion facilitates self-expression through accessible design and constant reinvention (Klymova et al., 2022).

Brands like Zara and H&M aim to democratize fashion by making contemporary styles widely accessible. As Klymova et al. (2022) observe, “mass-market fashion brands are leveraging digital platforms to expand their reach and offer trend-driven clothing to a broader audience”. Meanwhile, luxury fashion continues to function as a form of symbolic capital. Veblen (1899) famously described this as “conspicuous consumption,” where the display of wealth through fashion serves as a marker of social status. Fashion operates as a multi-layered communication system in which garments, accessories, and body styling collectively serve as symbols of identity and social meaning (Woodward, 2007).

These visible choices become part of a broader cultural language, where personal aesthetics interact with collective trends and norms (Vinken, 2005). From a sociological standpoint, Veblen (1899) introduced the idea that fashion serves as a form of conspicuous consumption, allowing individuals to display wealth and status. In contemporary contexts, this symbolic function extends to virtual garments as well. Ventre and Kolbe (2022) argue that digital fashion now mirrors traditional fashion’s role in identity construction and self-presentation. The performative nature of dress, whether physical or virtual, underscores fashion’s role as a system of signification deeply embedded in both material and immaterial cultures (Van Dijck, 2021).

Fashion in the 21st century continues to evolve from its historical role of wrapping and disciplining the body toward a more fluid and expressive form of identity construction. In digital environments, fashion becomes a tool for creative freedom, allowing users to experiment with form, movement, and cultural hybridity beyond physical constraints (Chen & Liu, 2023). This shift reflects a broader cosmopolitanism in fashion, where global

influences intersect and merge in virtual spaces, fostering intercultural dialogue and inclusivity (Musto & Yair, 2022).

At the same time, the fashion industry remains driven by the need for constant innovation, as new digital tools and platforms enable rapid cycles of design and production (Chen et al., 2023). In this context, fashion retains its original meaning to construct and shape while embracing the creative possibilities of emerging technologies.

2.2 History of fashion

In ancient societies such as Egypt, Mesopotamia, Greece, and Rome, clothing served both practical and symbolic functions. It communicated social hierarchy, religious belief, and cultural values. For example, in ancient Egypt, clothing and adornment symbolized spiritual protection and divine favor. Pharaohs and nobles wore garments made from fine linen, dyed fabrics, and elaborately designed jewelry (Tobin, 2013).

The Renaissance period witnessed a growing desire to express individual status and regional pride through clothing, particularly in the affluent city-states of Italy such as Florence and Venice. Clothing in the Renaissance increasingly mirrored the ideals of the time beauty, proportion, and human individuality while cities like Florence led the way in producing fine textiles (Frick, 2002). Fashion during this period was tightly regulated by sumptuary laws, which were designed to control social hierarchy and economic expenditure by restricting access to certain materials and styles.

These laws reinforced class distinctions by prescribing who could wear what, based on income, occupation, or noble lineage, and were part of broader efforts to stabilize social recognizability and govern personal appearance in early modern Europe (Hunt, 1996). Historical and cultural studies suggest that fashion has long served as a medium for expressing identity and challenging dominant norms, with digital fashion now continuing this legacy by enabling underrepresented voices and aesthetics to gain visibility in virtual spaces (Musto & Yair, 2022). Women's fashion in the Metaverse has become a complex site for the construction and performance of digital identity and social status, much like historical uses of clothing to signify familial prestige and wealth (Kwon & Yi, 2023). Virtual garments, particularly those tied to NFTs, are increasingly used as exclusive digital assets that reflect personal branding and cultural capital (Mason & Li, 2023). In this context, digital fashion items can be seen as a form of symbolic capital, echoing the historical role of clothing in dowry systems as portable wealth and public display of virtue (Klymova, Ryabova, & Lebedev, 2022). The public display of fashion has long been intertwined with social rituals

and gendered expectations, as clothing functions not only as personal adornment but also as a medium of cultural communication and identity (Barnard, 2002).

Renaissance fashion was significantly shaped by cross-cultural exchange, particularly through expanding trade networks with the Ottoman Empire, North Africa, and Asia, which introduced new textiles and decorative techniques into European markets (Grehan, 2023). According to Grehan these interactions enriched European dress practices with diverse materials and motifs, reflecting the cultural complexity of global trade in the early modern period. The development of a formalized fashion system is often traced to the 17th and 18th centuries in France. Under the reign of Louis XIV, Versailles became a stage for extravagant dress, where fashion operated as a tool of political spectacle and social hierarchy (Evans, 2013). This centralized model of influence laid the groundwork for fashion capitals and institutionalized trendsetting, a legacy that continues to shape the global fashion system today (Fletcher & Tham, 2015). According to Kawamura (2005), “Worth’s practice marks the beginning of the modern fashion designer who not only created garments but also shaped trends and consumer desire”.

In the 19th century, industrialization enabled mass production and standardized sizing, making fashionable clothing more accessible to the middle class (Steele, 1998). The rise of department stores and fashion periodicals during this period further contributed to the dissemination of trends across class and geographic lines (Perrot, 1994). The 1980s and 1990s, in particular, were marked by an increasing interplay between fashion and popular culture, as musicians, artists, and celebrities became style icons, and fashion houses began collaborating with or being influenced by street style (English, 2007). Designers like Vivienne Westwood and Jean-Paul Gaultier challenged conventional gender norms and used fashion as a form of subversive commentary, integrating punk, fetish wear, and historical references into their collections (Steele, 1996).

The rise of fast fashion has been closely tied to globalization, as fashion brands increasingly outsourced production to reduce costs and accelerate delivery, leading to the expansion of global supply chains and mass-market accessibility (Saricam & Okur, 2025). At the same time, Japanese designers such as Rei Kawakubo and Yohji Yamamoto disrupted Western fashion norms with avant-garde aesthetics that emphasized asymmetry, minimalism, and deconstruction, introducing a radical new vocabulary to the fashion world (Vinken, 2005).

The emergence of fashion capitals beyond Paris, London, Milan, and New York further reflected the decentralization of style leadership. Cities like Tokyo, Antwerp, and São Paulo developed distinctive fashion scenes, propelled by local designers and subcultures (Vinken,

2005). This global diffusion allowed for more pluralistic expressions of identity, drawing attention to regional traditions, political issues, and sustainability (Woodward, 2007).

In the late 20th century, fashion branding evolved into a powerful cultural force, with designers and marketers leveraging spectacle and symbolism to construct brand identity and consumer desire (Vinken, 2005). This era saw the emergence of the “supermodel” as a global icon, with figures like Naomi Campbell and Cindy Crawford embodying the aspirational image of luxury fashion, at the same time, minimalist aesthetics gained prominence, with designers such as Calvin Klein and Helmut Lang promoting clean lines and understated elegance as a reaction to the excesses of the 1980s (Clarke, 2023). Fashion in the 21st century is undergoing rapid transformation driven by globalization, digital innovation, and evolving consumer values (Chatterjee & Wang, 2023). Unlike earlier eras where trends were dictated by elite designers, contemporary fashion is increasingly decentralized and participatory. Consumers now actively shape trends and brand narratives through digital platforms, engaging in co-creation and influencing design and marketing processes (Chen & Liu, 2023; Mendoza & Miller, 2023). Social media has become a powerful force in shaping fashion culture, shifting influence from traditional authorities to digital creators and everyday users (Pereira et al., 2023).

Platforms such as TikTok and Instagram amplify user participation, allowing trends to emerge rapidly and spread globally in a matter of hours (Peterson & Saker, 2023). Fast fashion brands like Shein and Zara have adapted to this pace by leveraging digital technologies to shorten production cycles and satisfy consumer demand almost instantly (Periyasami & Periyasamy, 2022). While this responsiveness provides economic advantages, it also intensifies concerns regarding environmental degradation and unethical labor practices within global supply chains (Rissanen & Laitala, 2023). As fashion accelerates in the digital age, balancing innovation with sustainability becomes increasingly urgent (Pereira et al., 2022).

Virtual clothing, AR filters, and Metaverse fashion shows enable consumers to engage with fashion in entirely new, non-physical dimensions (Miller, 2021). Digital fashion houses such as The Fabricant, and platforms like DressX, are creating garments that exist only in the digital space, aimed at avatars or social media sharing. This opens new conversations about materiality, sustainability, and identity in the post-physical world (Rissanen & Laitala, 2023).

2.3 Importance of fashion

Fashion allows individuals and communities to express ethnicity, religion, social status, and gender. According to Barthes (1983), clothing operates as a system of signs semiotic tools that convey meaning beyond their material function. This idea is echoed in Entwistle's (2000) observation that dress is not just about covering the body but also about situating the individual within society. Through fashion, people communicate their belongings to or resistance against certain norms and traditions.

The appropriation and adaptation of traditional garments into contemporary fashion reflect both global connectivity and the ongoing struggle over cultural ownership (Rovine, 2009). Similarly, the rise of modest fashion among Muslim women demonstrates how dress can reconcile faith with style and consumerism (Lewis, 2015).

Digital garments in the Metaverse increasingly serve as cultural signifiers, reflecting personal identity, heritage, and social positioning in virtual environments much like traditional attire such as the sari, kimono, or kente cloth in physical cultures (Periyasamy & Periyasami, 2023). With globalization fostering greater cultural exchange, these traditional garments are increasingly being adapted and reinterpreted within contemporary fashion, both by mainstream designers and diasporic communities, highlighting a dynamic interplay between preservation and innovation (Niessen et al., 2003).

Fashion in digital environments has become a powerful medium for expressing identity, affiliations, and emotional states. As Gupta and Gentry (2022) explain, virtual fashion allows users to construct and project their identities in immersive spaces, often reflecting personal values and social alignments. This is particularly evident in youth-oriented platforms, where digital garments are used to signal subcultural belonging and individuality.

Musto and Yair (2022) highlight how digital fashion fosters inclusivity and gender fluidity, enabling users to explore cultural heritage and challenge traditional norms. These dynamics are further supported by de Borja and Rodriguez (2021), who argue that virtual environments facilitate the construction of digital personhood, where clothing and avatar customization become central to self-representation and community participation.

Fashion also plays a role in shaping and reflecting social movements. From the flapper dresses of the 1920s women's liberation movement to the Black Panthers militarized black jackets and berets, clothing has long been used to signify political resistance (Craik, 2009). In contemporary times, fashion is mobilized in protests such as wearing pink "pussy hats" during the Women's March or climate-conscious slogans in Extinction Rebellion actions demonstrating its ongoing relevance in activism (Steele, 2020). The global fashion industry is one of the most economically significant sectors, encompassing design, production, retail,

and media. According to the McKinsey Global Fashion Index, the industry was worth \$2.5 trillion in 2019 and employed over 75 million people globally (McKinsey & Company, 2019).

Moreover, fashion influences patterns of consumption and capitalism. The rise of fast fashion has created a model of mass production based on rapid turnover and disposable clothing. While this democratizes access to trendy apparel, it also raises ethical concerns regarding labor exploitation and environmental degradation (Niinimäki et al., 2020). In contrast, sustainable and slow fashion movements promote conscious consumption and ethical labor practices, highlighting fashion's potential as a tool for economic reform (Fletcher & Tham, 2015).

Digital innovation has also transformed fashion's economic landscape. E-commerce, influencer marketing, and virtual fashion have redefined how brands reach consumers. Platforms like Instagram and TikTok have created new economies of attention, where visibility often translates into capital (Leaver et al., 2020).

Fashion straddles the line between utility and art. It is a form of visual culture that engages with aesthetics, craftsmanship, and innovation. Designers like Alexander McQueen and Iris van Herpen are widely regarded not only as trendsetters but as artists who push the boundaries of material, form, and meaning (Bolton, 2011).

Museums and galleries increasingly exhibit fashion alongside painting and sculpture, affirming its artistic legitimacy. The Metropolitan Museum of Art's Costume Institute, for example, curates fashion exhibitions that draw millions of visitors each year, such as "Heavenly Bodies: Fashion and the Catholic Imagination" (2018), demonstrating fashion's ability to provoke dialogue and inspire awe (Koda & Bolton, 2018). Furthermore, fashion intersects with other creative fields, including film, music, and performance. Fashion styling in music videos, red carpet events, and stage performances plays a critical role in shaping celebrity personas and popular culture (Evans, 2013). Fashion is intimately tied to identity construction. It allows individuals to experiment with different versions of the self, often mediating between internal self-perception and external recognition (Woodward, 2007). The clothing one wears affects not only how others perceive them but also how they feel about themselves a phenomenon known as "enclothed cognition" (Adam & Galinsky, 2012).

The rise of virtual fashion, NFTs (non-fungible tokens), and Metaverse fashion shows have introduced a new paradigm in which clothing exists in a purely digital form (Miller, 2021). Digital-only fashion brands like The Fabricant or DressX offer garments that can be worn

online through augmented reality, challenging traditional notions of materiality and consumption (Rissanen & Laitala, 2023).

Platforms like TikTok and Instagram allow trends to go viral globally within hours, reshaping how consumers engage with style and aesthetics (Leaver et al., 2020). As a result, fashion brands are increasingly embracing digital wardrobe dynamics, allowing for more fluid and responsive product releases that move beyond the constraints of traditional seasonal cycles (McManus & Taylor, 2023). Although this environment encourages creative experimentation and responsiveness, it also leads to exhaustion and heightened stress among designers and influencers (Brydges & Hanlon, 2020).

3 METAVERSE

3.1 What is Metaverse?

The concept is not entirely new it was first introduced by science fiction author Neal Stephenson in his 1992 novel „Snow Crash“, where the Metaverse described a shared virtual space populated by avatars representing real people (Stephenson, 1992). Today, the term has evolved to describe a convergence of emerging technologies including VR, AR, blockchain, AI, and social media that collectively support persistent and interactive virtual environments (Mystakidis, 2022).

The Metaverse is typically understood as a network of interconnected, immersive, and persistent digital worlds where users can interact with each other and with computer-generated environments in real-time (Lee et al., 2024). According to Kumar et al. (2025), the Metaverse is “a convergence of multiple advanced technologies including AI, blockchain, and extended reality, forming a seamless and immersive digital ecosystem.” Unlike traditional virtual environments, the Metaverse aims to be persistent, meaning it continues to exist and evolve even when users are offline (Dionisio et al., 2013).

Another defining feature of the Metaverse is its immersive quality, which enables users to experience a high level of presence through technologies like VR headsets and haptic feedback devices (Slater & Sanchez-Vives, 2016). These experiences depend on emerging digital infrastructure such as 5G, cloud computing, and AI, which together enable real-time, high-fidelity interactions in virtual environments (Yoo et al., 2023).

Interoperability is a foundational element of the Metaverse, enabling users to transfer digital identities and assets across multiple platforms and environments (Murakami & Svensson,

2023). This vision is increasingly supported by blockchain technologies, which facilitate decentralized ownership and authentication of virtual goods through mechanisms such as non-fungible tokens (NFTs) and smart contracts (Ventre & Kolbe, 2022).

Early virtual environments like Second Life allowed users to engage in social, economic, and creative activities within persistent digital spaces, offering an early model of user-driven virtual worlds (Boellstorff, 2015). Contemporary platforms such as Roblox, Decentraland, and Horizon Worlds extend these foundations by integrating immersive technologies and decentralized systems that support complex social interactions and user-generated content (Yoo et al., 2023).

These developments reflect an ongoing shift toward more interactive and participatory forms of virtual engagement that blur the boundaries between creators and consumers (Van Dijck, 2021). The Metaverse has become a significant economic frontier, with projections estimating its market value could reach over \$800 billion by 2030 (Bloomberg Intelligence, 2021). This growth is fueled by investments in virtual real estate, fashion, gaming, education, and remote collaboration tools. Major brands such as Nike, Gucci, and Balenciaga have launched virtual products and experiences, signaling the Metaverse's increasing integration with the consumer economy (Laeq et al., 2023).

Socially, the Metaverse introduces both opportunities and challenges. On one hand, it promises to expand access to social interaction, creative expression, and economic participation, particularly for individuals in geographically or socially marginalized contexts (Mystakidis, 2022). On the other hand, concerns have been raised regarding data privacy, surveillance, digital addiction, and inequality in access to the necessary technologies (Rosenberg, 2022). Issues of content moderation and ethical governance are also critical, especially as the line between real and virtual actions continues to blur (Oh & Lee, 2022).

The Metaverse also holds transformative potential for education, offering immersive and interactive learning environments that can enhance student engagement and comprehension (Bailenson, 2018). Virtual classrooms, 3D simulations, and collaborative tools can support experiential learning across disciplines, from science to art and design (Wang et al., 2022).

Culturally, the Metaverse may become a new site for digital heritage, storytelling, and performance. Artists and cultural institutions are experimenting with virtual exhibitions and concerts that reach global audiences, reshaping how culture is produced and consumed (Evans, 2022). However, the digitization of culture also brings up concerns about authenticity, ownership, and representation in virtual spaces, as immersive technologies challenge traditional notions of cultural integrity and raise questions about who controls

digital heritage (Zhou & Jung, 2023). The integration of virtual reality into industrial and design processes reflects broader sociotechnical shifts, where immersive technologies are reshaping how users interact with digital environments and make decisions (Berg & Vance, 2017). It offers the potential for new forms of virtual presence, community building, and self-expression, becoming an extension of social and economic life rather than a separate realm (Davis, 2022).

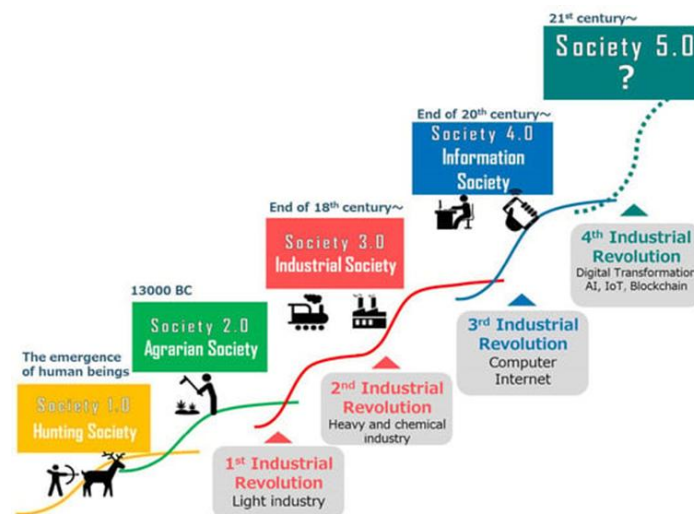
One of the most discussed aspects of the Metaverse is its potential to serve as a new layer of social infrastructure. Platforms such as VRChat, Fortnite, and ZEPETO have evolved into spaces where users engage in spontaneous interactions, live events, and user-generated storytelling, forming "digital third places" reminiscent of urban cafés or public squares. As Wanick et al. (2023) observe, these immersive environments are increasingly designed to enhance consumer experience through social interaction and augmented reality, blurring the lines between entertainment, retail, and community. According to Tapia (2023), digital fashion assets and virtual goods in the Metaverse are increasingly perceived as valuable commodities, not only for their aesthetic appeal but also for their investment potential and functional use within virtual economies. Decentralized finance (DeFi) mechanisms in platforms like Decentraland and The Sandbox allow users to buy, lease, and monetize virtual properties, blurring the line between play and labor (Park & Kim, 2022). Despite its promise, the Metaverse raises substantial ethical and psychological challenges. Kumar et al. (2025, p. 222) explains that "the immersive nature of the Metaverse may pose psychological and physiological risks due to the blurring of boundaries between real and virtual identities".

This digital immersion is deeply connected to evolving conceptions of self and embodiment. Lee (2022, p. 14) states, "digital identity and self-expression are central to users' experiences in the Metaverse, often leading to multiple personas across platforms". These dynamics generate philosophical debates about identity, presence, and agency. In terms of governance, Mystakidis (2022) observes that "governance, interoperability, and decentralization are fundamental challenges that must be addressed for the Metaverse to evolve responsibly". Furthermore, Papagiannidis et al. (2008) assert that "the ethical implications of virtual worlds include concerns about intellectual property rights, content moderation, and the protection of user data".

Because Metaverse platforms rely heavily on biometric tracking, behavioral data, and AI-powered personalization, the risk of surveillance capitalism becomes more acute (Zuboff, 2019). Users may unknowingly disclose personal information through behavioral cues such as movement patterns, gaze direction, or interaction styles in immersive environments data that can be tracked and analyzed to inform commercial strategies (Garcia & Nishida, 2023; de Borja & Rodriguez, 2021)

Baudrillard's (1994) theory of hyperreality where simulated experiences become more "real" than the physical becomes increasingly relevant as users engage in richly layered, immersive, and emotionally resonant virtual lives. The boundary between the real and the virtual is becoming porous, raising questions about authenticity, agency, and presence (Chalmers, 2022). Importantly, scholars argue that access to the Metaverse must be equitable to avoid reproducing existing social inequalities. Without intentional design, disparities in internet access, device affordability, and digital literacy may create a "virtual divide" that mirrors real-world exclusion (Van Dijck, 2021). Kumar, Kumar, Singh, and Bhutia (2025) emphasize that creating an accessible and inclusive Metaverse is essential to prevent marginalization and ensure that virtual environments reflect the diversity of their users. Society 5.0 is a concept first introduced in Japan as part of its national strategic plan to create a super-smart society that integrates technological innovation with social development (Rojas et al., 2021). It builds upon the fourth industrial revolution (Industry 4.0), but shifts the focus from pure technological efficiency toward the improvement of human life and societal well-being (Rojas et al., 2021). This vision proposes the incorporation of advanced digital technologies such as artificial intelligence (AI), the Internet of Things (IoT), robotics, and big data into daily life to solve complex problems like population aging, urban congestion, and resource scarcity (Rojas et al., 2021). One of its primary goals is to ensure a balance between economic development and the resolution of social challenges, thereby creating a sustainable and inclusive society (Rojas, 2021).

Figure 1: Society 5.0 as described by the Japanese government, "Super smart Society"



Source: Rojas et al. (2021)

3.2 Metaverse in our lives

As a convergence of AR, VR, and the internet, the Metaverse offers immersive, interactive environments where individuals can socialize, work, learn, and consume culture (Dionisio et al., 2013). These environments are not confined to gaming or entertainment; they increasingly influence education, healthcare, real estate, fashion, and even spiritual experiences (Mystakidis, 2022).

Platforms within the Metaverse, such as VRChat and Roblox, enable users to engage in real-time social interactions, participate in shared virtual experiences, and build communities across geographic boundaries (Yoo et al., 2023). The ability to express oneself through customized avatars and digital identities has introduced new forms of self-representation and cultural expression (Lee, et al., 2024).

In professional settings, the Metaverse is enabling innovative approaches to remote collaboration by creating immersive virtual workspaces that facilitate interaction and teamwork beyond traditional video calls (Yoo et al., 2023). For example, platforms like Microsoft Mesh and Meta's Horizon Workrooms are part of a broader trend where "virtual fashion experiences in VR spaces are enhancing user presence and engagement, simulating real-world interactions in immersive environments" (Kwon & Yi, 2023).

In education, immersive learning environments are transforming how students engage with content. Virtual campuses, interactive simulations, and AI-driven avatars allow for personalized and experiential learning experiences (Bourlakis, 2022). Universities such as Stanford and Nanyang Technological University have already launched Metaverse-based programs that blend physical and digital elements, supporting deeper engagement and participation (Choi & Kim, 2022).

The fashion and retail industries are also being reshaped by the Metaverse. Virtual showrooms, digital garments, and avatar customization have created new commercial opportunities for brands and consumers (Ventre & Kolbe, 2022). Consumers can try on clothes virtually, attend fashion shows in immersive worlds, and even purchase NFT-based fashion items that are wearable in games or virtual environments (Jain, 2022). In terms of mental health and well-being, Metaverse platforms are being explored for therapeutic applications. VR therapy is already used in treatments for anxiety, PTSD, and phobias, offering controlled, repeatable, and customizable environments for exposure therapy and relaxation (Maples-Keller et al., 2017).

Moreover, the Metaverse is enabling unprecedented opportunities for global social activism and community engagement, as users organize digital protests, awareness campaigns, and educational initiatives that transcend physical boundaries (Bonetti et al., 2022). In addition to activism, the Metaverse also fosters inclusivity by providing accessible platforms for participation regardless of location or mobility (Papagiannidis et al., 2008).

Urban planning and architecture have similarly benefited from immersive simulations, which allow designers and communities to collaboratively visualize, test, and modify city layouts in real time (Hudson-Smith et al., 2021). Virtual replicas of cities serve as digital twins, enabling predictive modeling of infrastructure, traffic flow, and environmental impact (Kitchin, 2021). According to Van Dijck (2021), the use of digital platforms in such processes must be critically assessed to ensure that public values like inclusivity, transparency, and accountability are upheld in urban development.

Economic systems within the Metaverse are evolving rapidly through the integration of blockchain technology, enabling decentralized ownership of virtual assets via NFTs and smart contracts (Tapscott & Tapscott, 2016). These tools allow users to buy and sell digital assets such as fashion and real estate, supporting the development of virtual marketplaces and new forms of economic activity (Yoo et al., 2023). According to Ventre and Kolbe (2022), digital fashion and NFTs have opened up novel commercial pathways, enabling designers and brands to monetize virtual creations through blockchain-based ownership and exchange.

Religion and spirituality are also entering the Metaverse, as immersive digital environments increasingly host virtual temples, mosques, and churches that facilitate both communal worship and personal reflection (Mystakidis, 2022). In digital religious environments, believers increasingly engage in spiritual practices that transcend geographic boundaries, creating new forms of sacred space within virtual platforms (Helland, 2016).

The growth of immersive environments in the Metaverse introduces complex psychological and ethical challenges, including risks related to privacy, emotional manipulation, and the blurring of real and virtual experiences (Westerman et al., 2023). As platforms collect and monetize user behavior at unprecedented scales, concerns around digital surveillance and loss of autonomy have intensified (Zuboff, 2019). Scholars argue that these developments necessitate the creation of governance frameworks that prioritize user well-being, transparency, and equitable access to virtual spaces (Van Dijck, 2021).

Digital identity in the Metaverse is also reshaping notions of gender, race, and body image by allowing users to create avatars that transcend physical-world limitations (Bailenson,

2018). This fluidity supports self-discovery and empowerment, especially for those marginalized in traditional societal frameworks (Nakamura, 2002). At the same time, it raises questions about authenticity, representation, and the psychological impact of managing multiple digital selves (Turkle, 2011).

Environmental concerns are increasingly tied to the Metaverse as debates emerge over its carbon footprint and energy use, particularly from data centres and blockchain transactions (Mann & Sandvig, 2023). The development and use of immersive technologies, along with the infrastructure supporting them such as high-performance data centres and blockchain systems consume significant energy and contribute to CO₂ emissions (Mann & Sandvig, 2023). However, proponents argue that digital fashion can offer sustainable alternatives to traditional practices by reducing the need for physical production and travel (Miller & Park, 2023). Sustainability in virtual design, such as optimizing rendering technologies and clean energy for servers, is becoming a new frontier for ecological responsibility (Zhang & Ban, 2023).

As virtual spaces become increasingly integrated into daily life, they are transforming foundational concepts of social interaction, identity, and cultural participation. Boellstorff (2015) emphasizes that virtual worlds are not separate from reality but form "actual worlds" where people build meaningful social lives. These immersive environments extend beyond leisure, offering spaces for collaborative creation, education, and commerce, thus reshaping societal norms (Zhou & Jung, 2023). Van Dijck (2021) argues that platforms now serve as infrastructural layers of society, influencing public values and democratic processes. Similarly, Yoo et al. (2023) note that immersive environments and smart avatars redefine how individuals engage with one another, creating new models of presence and co-existence. As these technologies become more embedded, they challenge traditional notions of citizenship and belonging by fostering decentralized, participatory forms of community (Yoo et al., 2023; Van Dijck, 2021).

4 FASHION IN METAVERSE

4.1 Evolution of fashion in the Metaverse

The fashion industry has undergone a profound transformation in the Metaverse, beginning with early experiments in avatar customization in online games like Second Life and evolving into complex virtual fashion ecosystems (Carter & Egliston, 2023). Initially seen as niche or novelty, virtual fashion now serves as a legitimate extension of self-expression and identity in digital environments (Gupta & Gentry, 2022). As digital worlds grew in

complexity and popularity, fashion brands began recognizing the marketing potential of virtual garments and immersive runway shows (Pereira et al., 2022).

The advent of digital-only fashion houses like The Fabricant marked a turning point, offering garments that exist purely in virtual form and are often traded as NFTs (Jin & Shin, 2023). These digital clothes are not limited by the physical constraints of textiles and gravity, allowing designers to explore fantastical aesthetics and impossible silhouettes (Pereira, Davvetas, & Marder, 2023). Luxury fashion brands such as Balenciaga and Gucci have already partnered with platforms like Fortnite and Roblox to launch exclusive virtual collections (Han, 2022).

Consumer engagement in the Metaverse is evolving from passive viewing to active involvement, with users creating and customizing their own digital fashion items and participating in creator-driven marketplaces on platforms such as Zepeto and Decentraland (Yoo et al., 2023). These participatory models are democratizing fashion by allowing everyday users to become designers and entrepreneurs in their own right (Chen & Liu, 2023). In parallel, virtual fashion weeks and exhibitions have emerged, hosting immersive events attended by avatars and streamed globally (Creswell & DeLisi, 2023). Fashion education is also adapting to this shift, with design schools incorporating 3D modeling, AR/VR prototyping, and virtual fashion show production into their curricula (Zeng & McKinney, 2023).

Digital fashion also fosters inclusivity and experimentation, enabling users to express gender fluidity, cultural heritage, and body positivity without physical limitations (Musto & Yair, 2022). Unlike physical fashion, virtual garments can be resized, recolored, or reimaged endlessly, giving users more control over how they present themselves (Tchach, 2023). These transformations have influenced real-world fashion as designers draw inspiration from virtual trends and aesthetics (Liu, 2023).

Limited-edition blockchain-backed fashion collections are now traceable, allowing creators to maintain copyright and profit from resales in secondary markets (Badhwar et al., 2023). This ensures transparent transaction records and supports sustainable revenue streams for digital designers, as digital ownership models mature within the fashion industry (Ventre & Kolbe, 2022).

Despite its promise, the Metaverse fashion scene faces challenges, including digital piracy, platform compatibility issues, and the environmental cost of blockchain transactions (Baek, 2023). To address these concerns, innovators are exploring energy-efficient protocols and cross-platform interoperability standards (Mann & Sandvig, 2023). As the line between

physical and virtual fashion continues to blur, brands must navigate a complex landscape of aesthetics, ethics, and technology (Rogers & Shaughnessy, 2023).

Virtual fashion shows and exhibitions have emerged as immersive events that attract younger, tech-savvy audiences, offering brands new avenues for engagement and storytelling in the digital age" (Creswell & DeLisi, 2023). Gen Z values self-expression and sustainability in virtual fashion, often prioritizing digital garments that align with their identity and ethical concerns" (Chatterjee & Wang, 2023). This generational preference is encouraging established fashion brands to explore immersive storytelling and digital engagement strategies within the Metaverse (Barrera & Shah, 2023).

Social media and influencer culture have merged with virtual platforms, where digital influencers wear virtual outfits and promote them across channels like Instagram, TikTok, and YouTube (Molnár & Horváth, 2022). These influencers, including AI-generated figures like Lil Miquela, serve as both fashion icons and marketing tools for virtual collections (Walsh, 2023). The hybridization of AI and fashion is creating new forms of narrative design, where brand identity is communicated through entirely synthetic personas (Pan, 2022).

Retailers are also experimenting with AR fitting rooms, which allow users to visualize how virtual clothes look on their physical bodies using mobile devices or smart mirrors (Cheng et al., 2023). This blending of real and virtual try-on experiences reduces return rates and enhances the personalization of online shopping (Zhang et al., 2019). Additionally, fashion shows are being reimaged through AR lenses, enabling users to project 3D models of garments into their own environments (Ghosh & Misra, 2023).

The convergence of fashion and gaming is another critical driver of innovation, as in-game outfits known as "skins" have become status symbols for players (Zhao & Wang, 2023). These skins offer aesthetic prestige and can be monetized through marketplaces within games or blockchain platforms (Peterson & Saker, 2023).

Digital fashion is increasingly shaping virtual economies and consumer behavior within the Metaverse, with significant implications for sustainability and innovation (Periyasamy & Periyasami, 2023). Virtual fashion has sparked interest in new forms of cultural heritage preservation by allowing designers to recreate historical garments or traditional motifs in immersive formats (Kwon & Choi, 2022). These projects not only educate users about diverse fashion histories but also help preserve endangered craft traditions through digital replication (Kwon & Yi, 2023). Metaverse fashion spaces can thus function as museums or educational hubs, expanding access to cultural knowledge (Park & Lee, 2023).

The role of AI in virtual fashion design is growing, with algorithms now capable of generating entire collections based on user data and trend analyses (Nguyen & Song, 2023). AI co-design tools assist both professionals and amateurs in creating unique garments, democratizing design and reducing development time (Rao, 2023). AI-driven virtual prototyping enables designers to visualize and refine garments digitally before production, significantly minimizing material use and reducing environmental impact (Wang et al., 2020).

Consumer behavior in the Metaverse is also influenced by gamification elements, where acquiring fashion items may involve quests, challenges, or achievements (Tanaka & Li, 2023). This interactive model increases brand engagement and user loyalty by turning fashion into a playful experience, as brands increasingly use gamified mechanisms and avatar customization to sustain consumer interest (Wanick et al., 2023). As more brands adopt this strategy, the boundary between entertainment and fashion continues to dissolve (Bourgeois, 2023).

Looking ahead, the future of Metaverse fashion is likely to be shaped by the emergence of open-source fashion communities that prioritize collaboration over competition (Huang & Valente, 2023). These decentralized platforms encourage transparency and creative freedom, contrasting sharply with the exclusivity of traditional fashion houses (Miller & Wang, 2023). With ongoing advances in wearable and affective computing, the potential to create garments that respond to touch, emotion, or environmental stimuli may significantly enhance immersion and reshape the sensory experience of clothing (Turner & Sakamoto, 2023).

As the boundaries between physical and digital environments dissolve, luxury fashion houses are capitalizing on exclusivity in the Metaverse by issuing limited-edition digital garments, often backed by blockchain technology (Klymova., 2022). These digital assets not only offer uniqueness but are traceable and tradable, making them desirable for both fashion enthusiasts and collectors (Tapia, 2023). Through NFTs, digital fashion is becoming a legitimate investment asset, mirroring trends in physical haute couture (Chernyaev et al., 2022).

Virtual fashion also supports greater inclusivity by allowing for avatar customization that reflects diverse identities and cultural expressions, expanding representation beyond the limitations of physical fashion (Chen & Liu, 2023; Chatterjee & Wang, 2023). The absence of material constraints in virtual environments enables designers to experiment with form and function in ways that transcend the limits of traditional garment construction (Zhou & Jung, 2023). As a result, digital fashion collections often feature bold, sculptural, or surreal aesthetics that would be impractical in physical production, allowing new modes of creativity and expression to flourish (Ventre & Kolbe, 2022).

Digital fashion shows, such as those hosted on platforms like Decentraland and Spatial, are also evolving into social spectacles, often involving gamified elements and immersive storytelling (Ferris, 2023). Attendees interact with virtual environments, influencers, and even AI-driven models in real time, creating hybrid fashion experiences that merge entertainment, commerce, and social media. As Zhou and Jung (2023) note, virtual fashion experiences in VR show spaces offer users a sense of presence and emotional engagement, enhancing the overall impact of digital showcases. These virtual showcases often receive as much media attention as traditional runway events, signifying their growing cultural relevance (Clarke, 2023).

Environmental sustainability is another important dimension in the evolution of Metaverse fashion, as digital garments produce significantly less waste and carbon emissions compared to physical clothing (Harper, 2023). Virtual fashion reduces the need for textiles, transportation, and mass production, offering a solution to the fashion industry's longstanding sustainability challenges (Cruz & Tomlinson, 2023; Harper, 2023). Brands focused on circular fashion are now integrating digital collections to reduce their ecological footprint and extend product life cycles through digital reuse (Hurst, 2023).

Interoperability across platforms remains a key challenge but also a future opportunity, as designers and brands envision clothing items that can be worn seamlessly in different virtual environments (Murakami & Svensson, 2023). Initiatives like the Digital Fashion Consortium aim to establish universal standards that allow garments to function across Metaverse ecosystems, reflecting the broader push toward interoperability and cross-platform consistency in virtual fashion (Ventre & Kolbe, 2022)

Advancements in AI, blockchain, and haptic technologies are set to transform fashion in the Metaverse by creating richer, multi-sensory digital environments (Wang et al., 2020). Virtual fitting rooms and augmented reality tools already offer interactive experiences that bridge physical and digital fashion, making online shopping more engaging and personalized (Wanick et al., 2023). These emerging interfaces may redefine how individuals form emotional attachments to garments, even if those garments exist only in code (Tian & Delgado, 2023).

4.2 Virtual fashion shows and collections

People accumulate experience interacting with space, which is the medium through which the world is perceived. Space is marked through dynamic interrelationships between itself and the various elements that make it up. Since space is not just a static, physical background,

attention should be paid to its active aspects (Murakami & Svensson, 2023). VR spaces provide people with virtual spaces, with social functions that are similar to the space (Barreda-Ángeles & Hartmann, 2022).

Virtual fashion shows leverage immersive virtual reality environments to create emotionally engaging experiences, where the digital space itself becomes integral to how audiences perceive and connect with fashion (Zhou & Jung, 2023). These immersive events are designed with interactive spatial aesthetics that blur the line between architecture, storytelling, and fashion design (Anuar & Jumrah, 2023). Unlike traditional runways, virtual fashion shows incorporate immersive audio-visual elements that enhance the storytelling of collections and engage audiences in novel, interactive ways (Martin & Bell, 2023).

According to Piscione and Drean (2023), the digital space in the Metaverse is evolving through immersive technologies that redefine digital interaction. Attendees can navigate these spaces using avatars, offering a sense of agency and presence that surpasses the passive consumption of traditional fashion media (Kwon & Yi, 2023). Virtual show environments often leverage surreal aesthetics or fantastical landscapes that would be logistically and financially impossible to recreate physically (Lindgren & Börjesson, 2023).

Through this reimagination of fashion presentation, virtual collections emphasize interactivity and immersion, often allowing audiences to explore garments from multiple perspectives or even manipulate the items in real time (Marques & Ortega, 2023). This shift has repositioned the viewer as an active participant in the fashion experience, aligning with broader trends in experiential media (Ibrahim & Chen, 2023). Some platforms even incorporate motion-capture performances or real-time audience reactions, enhancing the feeling of liveness and engagement (Franco & Yiannopoulou, 2023).

In addition to fostering creativity, virtual fashion collections contribute to the democratization of the industry by enabling emerging designers to showcase their work globally without the cost and limitations of physical shows (Laeq et al., 2023). These virtual platforms offer scalable spaces where designers can curate unique atmospheres that reflect their brand ethos while reaching diverse, geographically distributed audiences (Mendoza & Miller, 2023). The accessibility of virtual shows also supports greater cultural exchange, giving visibility to underrepresented aesthetics and traditions (Anuar & Jumrah, 2023).

Moreover, the integration of blockchain technology into virtual collections enables verifiable ownership, authenticity, and scarcity of digital fashion pieces, further elevating their value in both cultural and commercial contexts (Lee & van der Linden, 2023). Limited edition virtual garments can be bought, sold, or worn across multiple platforms, creating an economy of

digital collectibles that parallels physical luxury fashion (Janssen & Ko, 2023). As these practices evolve, the boundaries between consumer, collector, and co-creator continue to blur in virtual fashion spaces (Otto & Silva, 2023).

Virtual fashion shows are increasingly incorporating multisensory elements such as spatial audio, adaptive lighting effects, and real-time avatar reactions to replicate the emotional atmosphere of traditional runways (Nguyen & Wallace, 2023). These sensory cues enhance the immersive quality of digital presentations, allowing viewers to feel more engaged and present within the virtual environment (Martin & Bell, 2023). Additionally, some platforms now integrate features like real-time interaction and multilingual accessibility, making virtual fashion shows more inclusive and globally engaging (Creswell & DeLisi, 2023).

Digital fashion shows are increasingly integrating interactive elements that enhance audience participation and engagement. Anuar and Jumrah (2023) highlight how digital runways allow designers to express creativity through immersive formats that invite audience interaction, effectively turning viewers into co-creators of the experience. These shows not only mimic the communal energy of traditional events but also establish new forms of digital socialization. According to Clarke (2023), the rise of virtual fashion shows has captured significant media attention, demonstrating how these immersive formats foster collective excitement and redefine how audiences connect with fashion content online.

Digital fashion shows are increasingly incorporating interactive features such as live chats, social media integration, and real-time audience feedback, transforming passive viewing into participatory experiences (Ozuem et al., 2021). This participatory model mirrors the communal excitement found in live events while also fostering new types of digital socialization (Luna & Ahmed, 2023).

From a marketing standpoint, virtual fashion environments enable brands to gather detailed insights into consumer behaviour, including interaction patterns and engagement, which can inform future design and retail strategies (Garcia & Nishida, 2023). Heatmaps, click rates, and hover durations in 3D showrooms provide detailed consumer insights unavailable in traditional fashion events (Garcia & Nishida, 2023). Furthermore, the integration of e-commerce functionality into virtual fashion environments allows consumers to instantly purchase digital or physical garments, effectively merging the act of viewing with the act of buying (Ahmad et al., 2023).

Digital fashion collections are also influencing consumer expectations by promoting immediacy, customization, and sustainability in design (Schroeder & Kim, 2023). Consumers increasingly expect made-to-order or downloadable designs that can be adapted

to their avatars or even 3D-printed in real life, offering a hybrid model of fashion consumption (Cruz & Tomlinson, 2023). As a result, brands are beginning to rethink their product pipelines, creating collections specifically optimized for digital formats and interactivity (Tanaka & Grover, 2023).

Moreover, the archival potential of virtual fashion shows allows them to exist indefinitely in the digital realm, serving as ongoing points of reference, exhibition, and inspiration (Farahani & Liu, 2023). Unlike ephemeral physical runways, these shows can be revisited, updated, or reinterpreted through user-generated content and remix culture (Chen & Liu, 2023). This evolving dynamic contributes to a more fluid and participatory fashion history, where cultural memory is co-authored by designers, consumers, and digital platforms, and is increasingly shaped by digital artifacts and interactive technologies that extend collective memory beyond traditional boundaries (Heersmink, 2023).

The permanence of virtual fashion shows provides brands and consumers with a digital archive that not only documents style evolution but also becomes part of a shared cultural memory (Farahani & Liu, 2023). These events can be accessed long after their debut, giving them a longer lifespan compared to traditional physical shows that are limited by time and location (Zhou & Jung, 2023). Furthermore, the interactive nature of many virtual collections encourages users to revisit shows multiple times, each time discovering new elements or perspectives (Marques & Ortega, 2023).

As users engage with these immersive experiences, digital runway environments increasingly incorporate responsive audio-visual elements that enhance interactivity and narrative flow in real time (Martin & Bell, 2023), while the broader virtual context allows for identity expression and co-constructed meaning shaped by user interaction (de Borja & Rodriguez, 2021).

This dynamic spatiality enhances emotional involvement, especially when viewers can influence elements of the show such as camera angles, music, or lighting (Nguyen & Wallace, 2023). In this way, virtual fashion shows bridge the gap between exhibition and game design, providing a hybrid medium where users both watch and participate (Anuar & Jumrah, 2023).

Because of these interactive dimensions, the role of the audience in digital fashion has evolved into one of active participation and content creation. In platforms like Snapchat's Virtual Closet and Sephora's Virtual Artist, users engage with digital garments through augmented reality, influencing how fashion is perceived and shared (Wanick et al., 2023). This participatory behavior supports the notion of customer engagement as a co-creative process that can shape brand experiences and outcomes (Van Doorn et al., 2010).

Virtual runways also support global collaboration among designers, technologists, and media artists, bringing together interdisciplinary teams to craft multidimensional experiences (Creswell & DeLisi, 2023). Smaller or independent labels benefit particularly from this model, as the costs of hosting a virtual event are significantly lower than physical shows, while still offering access to international audiences (Laeq et al., 2023). As a result, fashion becomes a more inclusive and equitable space where visibility is no longer constrained by geography or budget (Anuar & Jumrah, 2023).

In terms of sustainability, digital fashion shows eliminate the environmental footprint associated with travel, venue construction, lighting, and physical sample production (Schroeder & Kim, 2023). This aligns with the growing demand among consumers for eco-conscious innovation in the fashion industry (Cruz & Tomlinson, 2023). The ability to test, preview, and iterate designs in virtual environments before producing physical versions also reduces material waste and increases efficiency (Tanaka & Grover, 2023).

Furthermore, blockchain integration ensures authenticity and ownership of digital garments, allowing for secure transactions and verifiable provenance (Lee & van der Linden, 2023). Limited edition digital outfits become collectable assets, traded or displayed across multiple platforms from gaming spaces to social VR to signify taste, affiliation, or exclusivity (Janssen & Ko, 2023). As virtual identities continue to evolve in complexity and importance, so too does the value placed on what digital personas wear and how they are seen (Kwon & Yi, 2023).

4.3 Future of fashion in Metaverse

The future of fashion in the Metaverse is increasingly shaped by decentralized technologies, particularly blockchain, which enable users to create, authenticate, and trade digital garments as NFTs (Ventre & Kolbe, 2022). As user-generated content becomes central to digital fashion ecosystems, consumers are taking on hybrid roles as both creators and curators, contributing to a participatory culture of co-creation (Mendoza & Miller, 2023). Additionally, the rise of open-access platforms and 3D garment simulation tools is democratizing fashion design, making it more accessible to individuals without formal training (Wang et al., 2020).

Artificial intelligence is also anticipated to revolutionize the creation of digital garments by automating design processes based on user preferences and trending data (Rahman & Kovács, 2023). AI-powered recommendation engines in the Metaverse will enable hyper-personalized styling based on behavioral, biometric, and contextual inputs (Liang & Doshi,

2023). Future virtual fashion experiences may also be tailored in real time to individual emotional states through affective computing (Turner & Sakamoto, 2023).

Interoperability between platforms is expected to be a major focus, allowing users to wear their digital garments across multiple Metaverse environments, games, and social apps (McQueen & Rossi, 2023). This cross-platform wearability will reinforce the value of virtual fashion assets and establish new norms for digital identity expression (Harvey & Søndergaard, 2023). With the rise of persistent virtual worlds, digital wardrobes may evolve to include seasonally rotating collections, just like in the physical fashion industry (Moreno & Paredes, 2023).

Sustainability will remain a key driver in the development of virtual fashion, as brands aim to reduce their carbon footprint and minimize waste by using digital twins and virtual prototypes (Rodríguez & Stein, 2023). New ecological metrics are being proposed to evaluate the environmental impact of digital fashion activities, particularly energy consumption from blockchain and rendering processes (Donovan & Meijer, 2023).

The shift toward more sustainable virtual fashion is also influencing younger consumers, who prioritize eco-conscious values in both physical and digital realms (Chatterjee & Wang, 2023). As the Metaverse continues to evolve, fashion brands are likely to invest in more sophisticated avatars and digital outfits that offer deeper personalization and customization options (Foster & Henry, 2023). This will involve the use of biometric data, such as facial recognition or movement patterns, to create garments that adapt in real time to users' emotional or physical states (Gao & Phillips, 2023). Digital fashion is expected to merge more seamlessly with augmented reality (AR), allowing users to modify their virtual outfits while interacting with the physical world (Bremner & Knight, 2023).

Collaborative projects between fashion designers and gaming studios will push the boundaries of creativity, resulting in entirely new forms of digital fashion that challenge conventional aesthetics (Li & Zhang, 2023). Virtual fashion collections will likely become more gamified, allowing users to earn, trade, or level up digital garments and accessories through interactive gameplay (Dawson & Hughes, 2023). These developments will blur the lines between fashion, entertainment, and gaming, creating new pathways for fashion houses to engage with younger, tech-savvy audiences (McManus & Taylor, 2023).

Fashion brands are increasingly adopting virtual try-on technologies and augmented reality to enhance the online shopping experience, allowing consumers to interact with digital garments without visiting physical stores (Wanick et al., 2023). Brands are expected to adopt mixed-reality showrooms where users can experience and purchase items in real-time while

interacting with other shoppers (Griffiths & Moller, 2023). The potential for virtual fitting rooms to simulate real-life body shapes and offer personalized style advice will significantly improve the shopping experience (Dixon & Hayes, 2023).

NFTs will continue to play a major role in the fashion industry, as they provide a way to authenticate ownership and exclusivity of virtual fashion pieces (Mason & Li, 2023). These digital assets will enable designers to release limited-edition items, providing scarcity and high demand within virtual communities (Richter & Lin, 2023).

As environmental sustainability becomes an increasingly urgent issue, virtual fashion shows and collections will help reduce the carbon footprint associated with physical events, such as transportation, waste, and energy consumption (Miller & Park, 2023). The fashion industry is increasingly adopting digital prototyping and 3D design tools to enhance sustainability by reducing material waste and minimizing the need for physical samples (Bonetti et al., 2022). The ability to experiment with limitless designs in a virtual space allows brands to innovate without the constraints of traditional manufacturing processes (Murray & Davidson, 2023).

In the evolving landscape of the Metaverse, digital fashion is emerging as a platform for sustainability and social engagement, enabling designers to advocate for ethical practices and environmental awareness through immersive virtual experiences. By hosting virtual fashion shows that promote ethical design or eco-friendly brands, the Metaverse will become a space where consumers can directly engage with causes that align with their values (Leung & Tan, 2023). This connection between digital fashion and social justice will further transform how consumers view fashion, emphasizing ethical and socially responsible practices (Santos & Jiang, 2023).

Digital fashion is increasingly merging with augmented reality, enabling users to visualize and wear virtual garments through mobile devices and AR interfaces in real-world environments (Wanick et al., 2023). This blending of physical and digital style is anticipated to create new social norms and etiquette around dressing and presenting oneself in hybrid spaces (Jung & Miles, 2023). As wearable technologies evolve, garments are expected to become interactive, responding to environmental stimuli or user input by dynamically altering their appearance (Gao & Phillips, 2023).

Luxury brands are likely to expand their digital fashion offerings by integrating Web3 technologies, fostering exclusive communities through NFT access passes and limited-edition drops (Brewer & Costa, 2023). Virtual showrooms and AI stylists will likely replace many traditional retail functions, offering interactive and personalized shopping experiences from anywhere in the world (Nguyen & Rinaldi, 2023). The ongoing gamification of digital

fashion will also drive deeper engagement, where style becomes a mechanic of play, status, and storytelling (Rossi & Feldman, 2023). As fashion education adapts to this shift, institutions are beginning to introduce Metaverse design programs that equip students with skills in virtual aesthetics, 3D modeling, and blockchain (Larsen & Whitaker, 2023). These programs aim to prepare the next generation of designers for a rapidly evolving digital fashion economy (Davies & Kwon, 2023).

As Metaverse platforms continue to grow, the integration of 5G technology will allow for faster and more immersive virtual fashion experiences, where high-resolution avatars and garments can be displayed without lag. According to Murakami and Svensson (2023), interoperability and technical infrastructure such as 5G and cloud rendering—are essential for enabling seamless, high-fidelity virtual fashion environments that support real-time interaction and cross-platform wearability. The integration of 5G and immersive technologies like augmented and virtual reality is transforming the way users experience digital fashion, enabling faster, more responsive, and high-fidelity interactions within virtual environments (Wanick et al., 2023). Simultaneously, artificial intelligence is being used to optimize retail experiences by analyzing consumer behavior and providing personalized recommendations, reshaping how trends are forecasted and products are developed (Yoo et al., 2023).

The future of virtual fashion will also be influenced by the increasing role of augmented reality (AR) in real-world shopping, where consumers can seamlessly blend their physical world with virtual fashion elements, creating new consumer experiences (Lee & Park, 2023). AR-powered tools in shopping apps may allow users to see how digital garments fit with their own physical attire before purchasing or swapping styles in real-time (Schultz & Kumar, 2023). This blending of physical and digital fashion will likely challenge the traditional boundaries of clothing retail by offering hyper-realistic digital trials that mirror real-life shopping interactions (Thompson & Keane, 2023).

Moreover, NFT fashion marketplaces are expected to grow, providing a unique ecosystem for virtual fashion that emphasizes scarcity, ownership, and exclusivity in a way that is distinct from traditional fashion (Tian & Moore, 2023). These digital assets, secured through blockchain, will allow creators to engage with their fanbase in new ways, offering limited-edition, customizable virtual garments that cannot be replicated or forged (Morris & DeLuca, 2023).

In terms of collaboration and democratization, the Metaverse will continue to facilitate cross-industry partnerships, as fashion brands work with technology firms, game developers, and digital artists to create innovative virtual experiences (Ventre & Kolbe, 2022). As a result, fashion shows and digital clothing collections will become more integrated with game

mechanics, allowing fashion-conscious players to earn, collect, and showcase virtual items within gaming platforms (Mason & Roberts, 2023). Fashion designers are beginning to incorporate digital storytelling techniques into virtual fashion experiences, using immersive audio-visual elements and interactive environments to enhance user engagement (Martin & Bell, 2023). The integration of user-generated content in virtual fashion will allow fans and enthusiasts to co-create with designers, influencing collections and further enhancing personalization (Mendoza & Miller, 2023).

Sustainability efforts in virtual fashion will likely increase as well, as more designers choose to reuse and repurpose digital assets, reducing the need for new resources while offering more sustainable alternatives (Murray & Davidson, 2023). Additionally, the Metaverse is reshaping traditional supply chain models by minimizing the need for physical production and distribution, thereby reducing material waste and carbon emissions associated with conventional fashion logistics (Saricam & Okur, 2025).

5 EMPIRICAL ANALYSIS

5.1 Methodology

This study employs a biometric experiment and qualitative research to explore participants' emotional responses and perceptions of fashion exhibitions within the Metaverse. The research utilized facial expression analysis and semi-structured interviews in order to get good quality results. Facial expression analysis capture respondents' real-time emotions and reactions while they watch the prepared material.

This approach enabled us to gain a deeper understanding of their genuine perceptions and experiences within the Metaverse. Interviews gather in-depth insights from respondents, allowing for flexibility in discussions while maintaining consistency across key themes. The study focuses on identifying attitudes, expectations, and potential barriers to acceptance of Metaverse fashion through a structured yet adaptable dialogue.

The facial expression analysis was conducted with a sample of 20 participants, all of whom were in their twenties and currently enrolled in a master's degree program. This relatively homogeneous group was selected to ensure consistency in terms of age, educational background, and familiarity with digital technologies, factors considered relevant for evaluating emotional engagement in virtual environments such as the Metaverse. In addition to biometric data collection, qualitative interviews were conducted with 10 participants. The number of interviews was determined based on the principle of data saturation, whereby the

repetition of responses indicated that no new insights were emerging. This allowed to draw reliable conclusions without the need for further interviews, ensuring both efficiency and analytical depth.

This study employed facial expression analysis to evaluate emotional engagement during a virtual fashion show presented in Metaverse. The experiment was conducted in a neuromarketing laboratory using iMotions software, which integrates facial recognition technology to capture and analyze emotional responses based on visible facial cues. Each participant individually viewed a one-minute video specifically designed for the study, featuring alternating clips of models and garments to simulate the atmosphere of a digital fashion show. The sessions were held in a controlled classroom environment, with four participants present during each round of testing. This setup ensured uniform viewing conditions and minimized external variables that could influence emotional responses. Throughout the viewing, participants' facial expressions were recorded via a camera integrated with the iMotions platform. Upon completion, the emotional data were processed, summarized and visualized as a line graph, illustrating the temporal dynamics of emotional reactions throughout the video. This visualization enabled a detailed assessment of emotional engagement, highlighting specific moments that elicited distinct emotional responses and providing insights into the affective impact of virtual fashion content.

The analysis was conducted using aggregated data from all respondents, allowing for a comprehensive evaluation of all seven emotions captured during the study. These emotions include: anger, joy, disgust, sadness, fear, contempt and surprise (iMotions, 2017). Joy is a positive emotional response typically associated with pleasurable experiences, personal achievement, or aesthetic appreciation. In psychological terms, joy is considered a high-arousal, positive-valence emotion that can enhance cognitive flexibility and creativity (Fredrickson, 2001).

Sadness is a low-arousal negative emotion often resulting from loss, disappointment, or social disconnection. While typically unpleasant, it can promote reflective thinking and foster empathy (Bonanno et al., 2008). Fear, on the other hand, is an adaptive response to perceived threats, characterized by heightened alertness and physiological arousal. It prepares the body for defensive action and plays a central role in survival (Öhman, 2008).

Surprise is a brief emotional state elicited by unexpected events. It functions as a cognitive interrupt that redirects attention and can be either positive or negative depending on the context (Meyer et al., 1997). Disgust is a strong negative emotion typically evoked by offensive stimuli, such as bodily waste, decay, or moral violations. It functions to protect individuals from contamination and maintain social norms (Rozin et al., 2008). Anger is a

high-arousal negative emotion that arises in response to perceived injustice or goal obstruction. It often motivates action to confront or correct the source of frustration (Averill, 1983).

Contempt is a complex, socially oriented emotion often expressed through facial gestures such as a unilateral lip raise. It typically arises when an individual perceives another as morally inferior, incompetent, or unworthy of respect. Contempt plays a role in maintaining social hierarchies and enforcing group norms, but it can also hinder reconciliation and escalate conflict (Fischer & Giner-Sorolla, 2016).

This analysis examined the overall intensity and frequency of each emotion, identifying which emotions were most dominant and recurrent throughout the viewing experience. Additionally, the study explored the specific moments within the fashion show that elicited the most significant emotional responses, providing deeper insights into audience engagement and emotional dynamics in the Metaverse setting.

The interview process involves several key phases. First, participants were contacted, and their consent was obtained for participation in the study. Given the constraints of conducting research in the neuro-behavioural lab at the University of Sarajevo - School of Economics and Business, a sample of 10 respondents was selected using a convenient sampling method. Data saturation in qualitative interviews can often be reached within the first 10 interviews, making this number sufficient for identifying most key themes (Guest et al., 2006).

Following the selection process, semi-structured interviews were conducted in a controlled environment where participants were exposed to a standardized stimulus, a short video showcasing a virtual fashion exhibition featuring renowned global brands. During the interviews, respondents were encouraged to articulate their initial reactions, evolving perceptions, and emotional responses to the digital fashion content. The interactive nature of face-to-face interviews allows for clarifications, deeper probing into responses, and a more nuanced understanding of the participants' experiences.

To protect the privacy and anonymity of the participants, each interviewee was assigned a unique code ranging from A to J. These codes were used in the data analysis instead of their real names to ensure confidentiality and discretion. The collected interviews were analysed using thematic analysis, a qualitative method that allowed for identifying, organizing, and interpreting key patterns within the data. This approach enabled a systematic examination of participants' narratives, focusing on recurring themes related to their emotional responses, perceptions, and acceptance of fashion in the Metaverse. By grouping responses into meaningful themes, the study provided a comprehensive understanding of how participants

engaged with and reacted to digital fashion experiences, highlighting potential trends, concerns, and opportunities

5.2 Interview Results

The research questions were systematically posed to the respondents, and each was addressed through a comprehensive thematic analysis of their responses. This analytical approach facilitated that insights were grounded in the data, allowing for a refined understanding of participants perspectives in relation to the study's objectives.

RQ1: Is the Metaverse already well-defined, or is it still unclear what it is and what it's used for?

The responses to the interviews suggest that the Metaverse is still an ambiguous and evolving concept rather than a well-defined entity. While some participants had prior knowledge of the Metaverse and its applications, many expressed uncertainties about what it truly represents or how it functions. Several respondents mentioned having only a general awareness of it, indicating that the concept remains unclear to the public. For instance, one respondent stated:

"I don't know much about the Metaverse in general. I know there are avatars and that more and more people are focusing on online content instead of physical events." (Respondent B)

This response highlights a basic understanding of the Metaverse as a digital space but lacks clarity on its broader implications and applications. A recurring theme in the interviews was the perception of the Metaverse as a parallel or alternative reality, but not necessarily one that offers a complete or immersive experience comparable to the real world. One respondent described it as follows:

"I don't know much about it. Metaverse seems like a parallel world to me, live shows give you a lot more than Metaverse." (Respondent C)

This implies skepticism about its ability to fully replicate real-world experiences. This suggests that while the Metaverse may provide an engaging digital space, it has yet to reach the level of realism or interaction that some users expect. Additionally, interaction within the Metaverse appears to be limited in ways that impact engagement and realism. Physical presence allows for nuanced body language, spontaneous social interactions, and tangible engagement with the environment, elements that are often difficult to recreate in digital spaces. While avatars and virtual worlds attempt to simulate these dynamics, they can feel artificial or detached, leading some users to perceive the Metaverse as fake.

Additionally, several interviewees noted that their exposure to the Metaverse was limited or superficial. These brief and somewhat indifferent responses indicate that the Metaverse, despite being widely discussed in technology and media circles, has not yet solidified its role or significance in the minds of everyday users. It remains a novel but vague concept for many. Interestingly, some respondents associated the Metaverse primarily with visual stimulation and digital engagement rather than substantive interaction. One interviewee remarked the following:

"The images are constantly popping up, the colors are vibrant, and in a way, I think it's more attention-grabbing than watching a live show. The images change quickly, like a quick commercial, which may attract more attention than traditional shows." (Respondent E)

This emphasizes how the constant flux of images and colors grabs attention but does not necessarily provide depth. Another respondent added the following:

"It seems really fake. It seems totally unrealistic, although, ok, it can be a little inspiring in the sense that it's cool to see. Maybe I'm inspired by something else, but it's not something I'm really drawn to." (Respondent F)

This reinforces the idea that the Metaverse, at least in its current form, may struggle to convey authenticity or meaningful engagement. Another notable observation is the comparison between traditional and Metaverse-based fashion shows. One participant pointed out that even conventional runway shows can be unconventional, citing examples where models wear unusual items such as mattresses. However, they noted the following:

"I've never seen them do a fashion show in the Metaverse. This seems a lot more advanced than what I'm used to." (Respondent I).

This suggests that its primary goal was spectacle rather than innovation in fashion presentation. This perspective indicates that while the Metaverse is experimenting with new forms of digital expression, it may still be in a phase of trying to define its purpose beyond mere visual appeal. Furthermore, the educational value of the Metaverse experience appeared to be minimal for some respondents. One explicitly stated:

„No, I didn't learn anything from the video. I already had some basic knowledge about it and the video didn't add anything new to me. Also, everything happened so fast that I couldn't keep up. It was a bit confusing and distracting, so my focus often wandered. Overall, I didn't gain any new knowledge." (Respondent J).

This highlights the lack of informative depth in the content. This raises concerns about whether the Metaverse is currently being used effectively as an educational or experiential platform. For an emerging technology to be truly impactful in education or experiential learning, it needs to offer structured, immersive, and engaging interactions that promote understanding and retention. However, if the Metaverse is perceived primarily as a space for spectacle and entertainment rather than an informative medium, its ability to function as an educational tool may be limited. While a few respondents did acknowledge creative potential within the Metaverse, they also implied that it remains more of an artistic experiment than a functional digital world. One respondent noted that:

"I also understand that people use it to express creativity, but I don't see much actual activity on it." (Respondent A).

This implies that while digital spaces like the Metaverse provide opportunities for innovation, their practical applications are still limited or unclear to many users. There were also mentions of previous experiences with digital fashion through augmented reality, where users could see how clothing items fit on their bodies. One respondent expressed surprise that fashion shows were now being hosted in the Metaverse, stating:

"Mostly I came across augmented reality (AR), where you can see how a certain piece of clothing fits on your body." (Respondent I).

This reaction implies that the evolution of digital fashion into fully virtual environments is still relatively new and unfamiliar to many. Another point of consideration is that those who were already somewhat familiar with the Metaverse did not necessarily feel that their understanding deepened through the experience. This suggests that the Metaverse, in its current state, may not be effectively expanding or clarifying its purpose even for those who have prior exposure. All in all, the interviews suggest that the Metaverse remains an ill-defined concept, with varying degrees of familiarity and skepticism among respondents. While some recognize its potential for creativity and engagement, many find it unclear, overwhelming, or lacking in depth. The perception of the Metaverse as a flashy but superficial experience further reinforces the idea that its role in digital culture is still developing. Thus, while the Metaverse has made significant strides in attracting attention, it has yet to establish itself as a clearly understood and widely accepted digital space with concrete applications.

RQ2: Do respondents alter their feelings after viewing the content?

The responses from the interviews suggest that while some respondents altered their feelings after viewing the content, others remained indifferent or even developed negative sentiments. The overall trend indicates a mix of curiosity, skepticism, and occasional excitement about the potential of the Metaverse in the context of fashion design. However, the extent to which their perceptions changed varies significantly from person to person. Some respondents expressed a shift in their perspective, particularly in how they perceive virtual fashion and branding within the Metaverse. One interviewee noted:

"It's definitely changing perceptions. I look at it differently now than I did before. If we compare the virtual world and reality, I think we'll think of these brands as being innovative, forward-looking, and future-focused." (Respondent E).

This is suggesting an increased appreciation for the innovative potential of virtual fashion. Similarly, another respondent acknowledged that brands engaging in the Metaverse could be seen as forward-thinking:

"I believe they are the first in the industry to do this." (Respondent I).

These responses indicate that exposure to Metaverse-related content can create a sense of novelty and innovation. However, not all respondents were positively influenced by the content. Several expressed a sense of detachment or skepticism. For instance, one interviewee felt that the concept of translating real-world fashion into the Metaverse lacked creativity:

"If you're already using a medium that allows for unlimited creativity, like 3D design, then why just copy clothes from the real world? You can create something far more avant-garde, experimental and unique. That would be a much better way to harness the potential of the Metaverse." (Respondent A).

This suggests that while exposure to the Metaverse sparked critical thinking, it did not necessarily result in a more favorable view of virtual fashion. Some respondents felt confused by the rapid changes associated with digital fashion. One noted:

„It didn't appeal to me in a positive way - I feel more of a negative emotion because everything is changing so quickly." (Respondent B).

This indicates that the introduction of new technological advancements in fashion might create unease rather than excitement for some individuals. Additionally, several participants remained largely indifferent to the content and maintained their initial opinions about fashion in the Metaverse. One respondent explicitly stated the following:

"Honestly, it doesn't change my opinion of the brands at all." (Respondent H).

This demonstrates that the exposure did not necessarily lead to a perceptual shift. Another participant suggested that brands engaging in the Metaverse were simply following trends rather than being truly innovative:

„I would rather say they just follow trends than be truly innovative." (Respondent I).

There were also indications that exposure to Metaverse fashion might deter some individuals from engaging with brands too focused on digital innovation. One respondent remarked:

"No, I don't think it would affect my opinion of the brand. In general, it's not something I'm interested in and I don't think I would follow a brand anymore because of it. I think I would even lose interest if they focused too much on the Metaverse." (Respondent J).

This suggests that while the Metaverse may appeal to certain demographics, it could alienate others who are less interested in virtual fashion. While some respondents acknowledged that virtual worlds have commercial potential, they were uncertain about the long-term sustainability of fashion in the Metaverse. One stated the following:

"It doesn't make much sense to me personally. But who knows, maybe that's the future. And maybe everything fails after a while. I don't know, that's just my opinion." (Respondent D).

This highlights the speculative nature of Metaverse fashion and the uncertainty surrounding its adoption. Some interviewees did find similarities between traditional and digital fashion events, indicating a degree of recognition. One of them noted:

"I saw Metaverse for the first time, I had no experience with it, but I think it is quite similar to my experiences with live shows." (Respondent G).

This suggests that while digital fashion shows may replicate certain aspects of physical events, they may not yet offer the same level of engagement or immersion. All in all, the responses suggest that while Metaverse-related content can spark interest and critical engagement, it does not universally alter perceptions. Some respondents became more open to the idea, others grew more skeptical, and a significant portion remained indifferent. The variation in responses suggests that the impact of Metaverse fashion is still highly subjective and dependent on personal inclinations and familiarity with digital spaces.

RQ3: What specific emotional responses do participants experience when viewing virtual fashion shows in the Metaverse?

The emotional responses to virtual fashion shows in the Metaverse vary widely among participants, ranging from fascination and excitement to confusion, discomfort, and even apathy. The diversity in reactions suggests that virtual fashion, while innovative, evokes complex and often conflicting emotions depending on the viewer's level of interest in fashion, familiarity with digital media, and perception of technological advancements. One of the dominant emotions expressed by several participants is confusion. For instance, one interviewee mentioned the following:

"Most of the time I felt confused because the pictures kept changing and I didn't know what to expect. Everything felt advanced, whether it was the creations themselves or how realistic some of the models looked." (Respondent A).

This suggests that the dynamic and fast-changing nature of digital fashion presentations can be overwhelming for viewers unfamiliar with the format. Similarly, another participant described the experience like this:

"It seems interesting to me, but at the same time a bit confusing. I can't understand this new trend." (Respondent C).

This confusion may stem from the unconventional nature of virtual fashion shows, which diverge significantly from traditional runway presentations. In contrast, some participants felt a sense of excitement and intrigue. One respondent expressed enthusiasm, stating the following:

"I found it interesting and frankly attractive. A different concept of fashion, something I haven't seen before, and that really attracted me. I felt a lot of excitement. It certainly changes perception. Now I look at it differently than before." (Respondent E).

Another interviewee highlighted the technical aspects of the video rather than the fashion itself, describing the following:

"The editing and the way the video was edited was exciting to me. However, I'm still a bit skeptical about the technology in this context, so I find it a bit disturbing how much everything has advanced and how realistic it can look." (Respondent I).

These reactions indicate that virtual fashion can captivate audiences who are either interested in fashion innovation or impressed by the technological execution. Another viewer reported a slight fear about how rapidly technology is changing the fashion industry:

"The confusion dominated, and at some point, I also felt a slight fear due to the rapid changes in technology and the way fashion evolves." (Respondent B).

This aligns with broader concerns about the increasing role of artificial intelligence and digital avatars, which can sometimes provoke a sense of unease due to their near-human yet artificial appearance. A sense of detachment or emotional indifference was also a recurring theme. Some respondents reported being largely indifferent to the experience, with one stating the following:

"I would say that I was 70% indifferent, but 30% I was a little surprised." (Respondent C).

Another explicitly mentioned this:

"I didn't have any emotions because it's not something I'm interested in." (Respondent G).

This suggests that while virtual fashion may be appealing to certain audiences, it does not necessarily engage those who are not already interested in either fashion or digital art. For some, the experience was underwhelming rather than exciting. One participant remarked that the virtual designs were not particularly innovative, stating the following:

"I didn't have anything negative because today we see all kinds of things. It's nothing new, nothing innovative that I remember. I remember a blue dress and a belt, something metallic, but nothing that blew me away. Mostly indifferent." (Respondent F).

This suggests that for individuals who have been exposed to digital visuals frequently, virtual fashion may not always be perceived as ground-breaking. However, there were also participants who experienced a mixture of emotions, torn between intrigue and scepticism. For example, one person acknowledged the following:

"The clothes seemed realistic - we could see them in real fashion shows today. I found it somewhat interesting, I can say that. But I definitely think it is the future, because we are already seeing similar ads." (Respondent D).

Another participant mentioned feeling initial fascination but eventually losing interest, highlighting that while the production quality was high, they were relieved when the video ended:

"It was clear to me from the very beginning that everything was virtual. It seemed very well done, but at no point did I think I was watching something real. I was relieved when the video

ended. After a few seconds, I lost my attention, because he was not interesting to me. Generally, it's not something I'm interested in in life." (Respondent J).

In addition to that, a few interviewees indicated a change in perception due to the experience. One individual admitted that the virtual fashion show made them reconsider how they view fashion brands, acknowledging the innovation behind the digital presentation:

"I found it interesting and frankly attractive. A different concept of fashion, something I haven't seen before, and that really attracted me. I felt a lot of excitement. It certainly changes perception. Now I look at it differently than before. If we compare the virtual world and reality, I think we will think of those brands as innovative, forward-looking and future-focused." (Respondent E).

This suggests that, for some viewers, exposure to virtual fashion can shift their understanding of industry trends, making them more aware of digital advancements. The responses highlight that emotional responses to virtual fashion shows in the Metaverse are not uniform. Instead, they depend on individual perspectives, prior exposure to digital content, and attitudes toward fashion and technology. While some viewers are captivated by the futuristic nature of these presentations, others experience discomfort, confusion, or disinterest.

Ultimately, virtual fashion remains an evolving concept. As technology continues to integrate with fashion, these emotional responses may shift, with increasing familiarity potentially reducing confusion and discomfort while enhancing appreciation for digital craftsmanship. However, the divide between those who embrace innovation and those who remain indifferent or skeptical suggests that virtual fashion may not resonate equally with all audiences.

5.3 Facial expression analysis results

The research investigated the emotional responses elicited by virtual fashion experiences within the Metaverse, focusing on seven core emotions: joy, sadness, fear, surprise, disgust, anger, and neutrality. These emotions were measured through facial expression analysis as participants engaged with digital fashion content in immersive virtual environments. The findings provide critical insight into how fashion, when experienced in virtual spaces, can stimulate emotional reactions comparable to or distinct from those triggered by physical fashion.

The stimulus used in this research is a one-minute virtual fashion show designed to evoke emotional and cognitive responses related to digital fashion in the Metaverse. The show

features a dynamic sequence of avatars modeling various fashion creations. Some avatars walk along a virtual runway, while others remain stationary and pose. The primary focus is on the garments themselves, with frequent zoom-ins that highlight the details and textures of each outfit. The fashion creations are visually striking, characterized by vibrant colors and diverse styles, some of which are particularly bold and attention-grabbing. This visual richness is further enhanced by a fast-paced instrumental soundtrack, which accompanies the entire show. The music contains no lyrics and serves to set the rhythm and tone of the presentation, contributing to a more immersive and engaging experience for the viewer.

Figure 2 presents aggregated data showing the respondents emotional fluctuations across all seven emotions that were measured. The figure also highlights specific segments of the video where emotional intensity was notably marked among the participants.

Figure 2: Aggregated results of Facial expression analysis



Source: iMotions

Table 1: Average number of seconds felt for each emotion

<i>Anger</i>	<i>Contempt</i>	<i>Disgust</i>	<i>Fear</i>	<i>Joy</i>	<i>Sadness</i>	<i>Surprise</i>
0.13	0.16	0.02	2.55	9.56	0.11	2.06

Source: Own work

The virtual fashion show in the Metaverse elicited the highest levels of joy, accounting for 9.54% of the total emotional responses recorded. This emotional response was primarily driven by the presence of vibrant colors, engaging music, and visually appealing scenes. Interestingly, despite many participants encountering such digital content for the first time,

the immersive presentation was perceived as highly attractive and emotionally stimulating, demonstrating the Metaverse's potential to evoke positive affective reactions, even among those unfamiliar with virtual environments.

In addition to joy, two other emotions were notably present: fear (2.55%) and surprise (2.06%). These findings suggest that the elicitation of joy did not preclude the simultaneous experience of more complex emotions. Fear often stemmed from the uncertainty and unpredictability of the virtual experience participants reported unease due to not knowing what would appear next as the visual content rapidly changed. This cognitive uncertainty appears to have also contributed to the emotion of surprise, indicating a strong interaction between these two affective states in novel digital settings.

On the other hand, negative emotions such as anger (0.13%), disgust (0.02%), sadness (0.11%), and contempt (0.16%) were expressed at very low levels. These minimal values indicate that the virtual fashion experience was largely well-received and did not provoke significant adverse reactions. The low expression of these emotions may be attributed to the aesthetic focus of the content, the absence of disturbing elements, and the novelty factor, which might have contributed to a more open and curious viewer mindset rather than a critical or negative one.

RQ4: How do emotional reactions to fashion in the Metaverse differ based on the participants' age and professional background?

Due to the characteristics of the sample, it is not possible to provide a definitive answer to this question. The analysis is limited to respondents in their twenties, all of whom are Master's students at the Faculty of Economics in Sarajevo. However, their professional background has not been clearly specified, which restricts the generalizability and interpretability of the findings.

Emotional reactions to virtual fashion in the Metaverse appear to vary notably between respondents in their early and late twenties. Participants in their early twenties tended to show more curiosity, engagement, and openness, while those in their late twenties were more likely to express skepticism or indifference. This pattern suggests that digital fashion may resonate more with individuals who are still shaping their perspectives on fashion and technology, whereas those approaching their thirties may have more established views aligned with traditional fashion norms.

Participants in their early twenties displayed strong emotional responses, ranging from fascination to discomfort. For instance, a 21-year-old respondent reported feeling a mix of

"mild disgust and disappointment" (Respondent A), which could indicate resistance to the shift from physical to digital fashion. Similarly, a 22-year-old participant experienced a dominant sense of "confusion" and a "slight fear" due to the rapid evolution of technology in fashion (Respondent B). This suggests that younger audiences, despite growing up in a digital age, may still struggle to process the fast-paced changes in fashion presentation.

In contrast, participants in late twenties tended to show more neutrality or skepticism. A 26-year-old respondent was largely indifferent, recalling only a few specific visual elements and stating that it was "nothing new or innovative enough to be memorable" (Respondent F). Likewise, another 28-year-old participant found the technology impressive but unsettling, mentioning the "uncanny valley" effect, where digital models appeared both realistic and artificial, creating discomfort (Respondent I). This suggests that while the technical aspect of digital fashion may be appreciated, older viewers may be more critical of its realism.

The level of engagement also varied depending on the participant's personal interest in fashion. Those with a stronger interest in design or branding found virtual fashion more compelling. A 22-year-old participant, for instance, described the experience as "interesting and genuinely appealing", emphasizing how it changed their perception of fashion brands and their future direction (Respondent E). This implies that individuals interested in creativity and innovation may be more open to the Metaverse as a platform for fashion.

Conversely, participants with little personal interest in fashion displayed emotional detachment or disinterest. A 25-year-old male respondent stated that he had "no emotions" because fashion was not something that interested him (Respondent G). Another male participant of the same age admitted that while the video was well-produced, he felt "relief" when it ended because he quickly lost interest (Respondent J). This indicates that those without an inherent interest in fashion may not find virtual fashion any more engaging than traditional runway shows.

Interestingly, some participants found the Metaverse's technical aspects more engaging than the fashion itself. A 26-year-old male respondent, who expressed no particular interest in fashion, found the visual transitions and digital effects "very interesting" (Respondent H). Similarly, a 28-year-old female participant was more focused on the video's editing and effects rather than the clothes themselves, describing the production as "exciting" but also slightly unsettling (Respondent I). This suggests that virtual fashion shows may attract audiences beyond traditional fashion consumers, particularly those interested in digital media and technology.

Overall, the results highlight the emotional richness and complexity of engaging with fashion in virtual environments. While joy remained dominant, the simultaneous occurrence of fear and surprise points to the psychological depth and immersive potential of Metaverse-based fashion presentations. These insights affirm that virtual fashion experiences can evoke a diverse range of emotions, offering fertile ground for further interdisciplinary exploration at the intersection of technology, aesthetics, and human emotion.

5.4 Discussion and recommendations

The theoretical framework presents the Metaverse as a revolutionary digital space that is reshaping fashion through immersive experiences, NFTs, and virtual commerce, with major brands actively investing in its development (Papagiannidis & Bourlakis, 2010). However, the interview results suggest that the Metaverse is still an ambiguous and evolving concept for many users. While the theory highlights its potential for engagement and innovation, the responses indicate a lack of clarity and practical understanding among consumers. Many participants found the Metaverse superficial, overwhelming, or visually stimulating but lacking depth, contrasting with the theory's depiction of it as a transformative force in fashion and retail. Furthermore, while the theory suggests that the Metaverse can enhance customer engagement through virtual try-ons, digital retail, and interactive experiences (Zhang et al., 2019), the results indicate that these features are not yet fully understood or widely used by consumers. Some interviewees acknowledged its creative potential but viewed it more as an artistic experiment rather than a practical tool. This difference suggests that while brands are pushing forward with Metaverse-based strategies, consumer adoption and understanding remain limited, indicating a gap between industry expectations and user perceptions.

In addition to that theory highlights the Metaverse as an innovative and transformative force in fashion, emphasizing its potential to enhance brand engagement, customer experiences, and digital commerce (Moura, 2023). It suggests that digital fashion, NFTs, and virtual stores will redefine the industry, attracting younger generations and fostering creativity. However, the results from the interviews indicate a more nuanced reality. While some respondents acknowledged the Metaverse's novelty and saw brands as forward-thinking, others remained indifferent or skeptical. Concerns about creativity, rapid technological changes, and potential detachment from traditional fashion values were also prominent. This contrast suggests that while the Metaverse holds significant promise, its adoption is not universally embraced. While many theoretical frameworks highlight the potential of digital fashion to enhance consumer engagement and brand loyalty (Yoo et al., 2023), empirical findings reveal a spectrum of user responses from curiosity and enthusiasm to skepticism and resistance (Barreda-Ángeles & Hartmann, 2022). Although the potential of digital fashion is widely acknowledged, its long-term impact on brand perception and consumer behavior remains

uncertain, indicating that Metaverse fashion is still in an exploratory phase rather than an established industry norm.

The results of the study highlight the diverse emotional responses to virtual fashion shows in the Metaverse, which align with but also challenge aspects of the theoretical framework. The theory suggests that the Metaverse offers new creative avenues for fashion engagement, allowing brands to enhance customer experiences through virtual shows, digital clothing, and interactive features (Moura, 2023). However, the findings indicate that while some participants experienced fascination and excitement, others felt confusion, detachment, or scepticism. This reflects a gap between technological advancements and user acceptance, as some viewers struggled to adapt to the unconventional nature of virtual fashion.

While the literature emphasizes the potential of the Metaverse to revolutionize brand loyalty and customer engagement (Van Doorn et al., 2010), the results show that not all consumers perceive these innovations as positive. Some respondents expressed indifference or even discomfort with the rapid digital transformation of fashion, mirroring broader concerns about the integration of artificial intelligence and blockchain technology. However, certain participants did acknowledge a shift in perception, seeing virtual fashion as a futuristic and innovative trend. This supports the argument that digital fashion can reshape consumer attitudes over time, particularly among those open to technological change. As the Metaverse continues to develop, increased familiarity and improved virtual experiences may bridge the gap between expectation and emotional reception.

The results of the study also align with the theoretical framework presented in the literature, particularly in terms of generational differences in engagement with digital fashion. As Moura (2023) suggests, younger generations, particularly Gen Z, are more immersed in digital spaces, making them more open to innovations like the Metaverse. This is reflected in the study, where younger participants displayed curiosity, fascination, and even discomfort, indicating both engagement and unease with the fast-paced technological evolution.

Furthermore, the study confirms the theory that professional background influences engagement, as participants with an interest in branding and design found digital fashion more compelling. This is consistent with the increasing role of NFTs and digital fashion collectibles in the industry. Additionally, the finding that some participants were more engaged with the technical aspects of virtual fashion rather than the clothing itself. These parallels demonstrate how digital fashion's reception is shaped by both personal and generational factors, reinforcing the notion that brands must tailor their Metaverse strategies accordingly.

Based on the analysis, the following conclusions can be identified:

Table 2: Identified topics

Prior knowledge and lack of new insights	Many participants were already familiar with the concept of the Metaverse before experiencing the virtual fashion show. However, the event did not provide them with fresh or profound insights into the Metaverse or its potential. For these participants, the experience felt redundant and uninspiring, as they didn't gain anything beyond their existing understanding of the digital space. This sense of familiarity led to disengagement and a lack of curiosity about the event.
Perception of virtual vs. realism	Despite the impressive visual quality of the fashion show, it became evident to most participants that the entire experience was virtual. While certain aspects, such as the clothing and avatars, looked remarkably realistic at times, the movement and behavior of the avatars felt mechanical and artificial. This disruption in realism created a barrier to full immersion, leaving participants aware that they were watching something digital. The "uncanny valley" effect, where things look almost human but still feel off, was a frequent point of discomfort.
Emotional detachment and neutral response	A significant number of respondents felt emotionally detached from the virtual fashion experience. Unlike traditional fashion shows, which often provoke strong feelings through sensory engagement, the virtual format failed to forge a meaningful connection with the audience. The lack of a physical, live presence contributed to a more passive reaction, with some participants expressing a sense of relief when the event ended. They were not drawn into the emotional narrative that physical fashion shows typically create.
Visual aesthetics vs. immersive experience	The visual quality of the digital fashion show was mixed. Some moments were visually captivating and well-crafted, but there was a noticeable inconsistency. Certain scenes achieved hyperrealism, while others fell short with poorly executed 3D animations. This inconsistency broke the immersion, making the experience feel fragmented. Though the visual design was often impressive, the lack of uniformity in execution hindered the potential for a fully immersive experience, leaving participants feeling distanced from the content.

Table 3: Identified topics (continued)

Metaverse as a commercial tool	Several participants viewed the use of the Metaverse by brands as primarily a commercial strategy rather than an innovative, artistic shift in fashion. For these respondents, the Metaverse was seen as a means for companies to capitalize on a trendy digital space and attract younger, more digitally savvy consumers. This perception reduced the impact of the event, as it was seen more as a marketing stunt than a genuine exploration of fashion's future. Some also expressed concern that the focus on monetization might overshadow the potential for creative expression within the Metaverse.
Missed creative potential in virtual fashion	One of the most notable critiques of digital fashion was the sense that it was underutilizing the creative freedom that virtual worlds offer. Instead of exploring avant-garde and experimental designs, much of the virtual fashion shown closely resembled real-world clothing. Participants questioned why digital designers weren't taking full advantage of the boundless possibilities the virtual world allows such as non-physical textures, dynamic transformations, or fantastical, futuristic designs that can't exist in the physical realm. This feeling of missed opportunity led to a sense of disappointment about the current direction of virtual fashion.
Technology anxiety and rapid change	Some participants felt uneasy about the speed at which technology was advancing in virtual spaces, particularly within the Metaverse. This sense of technological anxiety was often tied to broader trends, such as the rapid rise of cryptocurrencies or the increasing reliance on artificial intelligence. For these participants, the rapid pace of change raised questions about the sustainability of virtual fashion and whether it was part of a transient trend rather than a fundamental shift in the industry. There was a sense that the technology could evolve too quickly, leaving traditional fashion concepts behind without a clear understanding of how to integrate new developments.

Table continues.

Table 4: Identified topics (continued)

Virtual fashion as a marketing strategy	The use of virtual fashion in the Metaverse was often seen by participants as a marketing tactic, intended to raise brand visibility and appeal to younger, tech-savvy audiences. For some, this seemed like a natural progression, with brands attempting to stay relevant in a digital age. However, others felt this overemphasis on digital spaces was more about keeping up with the latest trends than a genuine attempt to innovate in the fashion industry. There was a strong sense that the Metaverse was being used more as a marketing tool to capitalize on a buzzword than as a meaningful new platform for creative exploration.
Lack of authenticity and human connection	Traditional fashion shows are known for their ability to forge an emotional connection with the audience through live, human interaction, and the sense of presence that comes with being physically there. Virtual fashion shows, on the other hand, failed to provide this level of authenticity. The absence of real human models and the physical presence of an audience made the experience feel distant and less engaging. Even when the digital avatars or designs were visually appealing, they couldn't replicate the emotional energy and sense of connection that live events naturally provide, leaving participants with a sense of detachment.
Uncertainty about long-term relevance	While virtual fashion shows may have garnered some interest, there was a prevalent uncertainty about their long-term relevance. Some participants acknowledged the potential of digital fashion, particularly for younger generations who are deeply immersed in digital spaces. However, there was a general skepticism about whether virtual fashion would become a permanent fixture or fade away as a passing trend. The uncertainty was tied to questions about whether virtual fashion could ever achieve the same level of cultural significance or value as physical fashion, and whether it would continue to grow or be overshadowed by other trends in the tech space.

Source: Own work

6 CONCLUSION

The findings of the research suggest that the Metaverse remains an evolving and ambiguous concept rather than a well-defined digital space with clear applications. While it is often portrayed as a revolutionary platform for social interaction, entertainment, and creativity,

many individuals still struggle to grasp its full scope and purpose. The lack of a unified understanding reflects both the nascent stage of the technology and the varying levels of exposure people have to it. This uncertainty raises questions about whether the Metaverse is currently meeting the expectations set by its proponents or if it is primarily serving as a visually engaging yet superficial experience. The emphasis on spectacle rather than meaningful interaction suggests that its development is still in progress, with its practical value yet to be fully realized.

Furthermore, the comparison between the Metaverse and real-world experiences highlights some of its current limitations. While digital spaces can offer immersive and visually stimulating environments, they often lack the depth, authenticity, and spontaneity of physical interactions. The challenge lies in making the Metaverse more than just a visually captivating platform, it needs to provide richer, more interactive experiences that feel substantive rather than fleeting. Additionally, its potential as an educational or experiential tool remains underdeveloped, with many users finding the content overwhelming or lacking in informational value. As the Metaverse continues to evolve, its ability to offer more structured, meaningful engagement will likely determine whether it can transition from being a novel digital experiment to an integral part of everyday digital culture.

In addition to that, the responses indicate that exposure to Metaverse-related content does not lead to a uniform shift in perception but rather sparks a diverse range of reactions. While some individuals develop a greater appreciation for the innovation and future potential of digital fashion, others remain sceptical or even disengaged. This suggests that the Metaverse's role in fashion is still in flux, appealing to those who view it as a forward-thinking development while alienating those who see it as either unoriginal or overwhelming. The lack of consensus highlights the challenge brands face in positioning themselves within this emerging space, balancing between embracing digital transformation and maintaining relevance to more traditional audiences.

Additionally, the responses suggest that digital fashion in the Metaverse may not yet provide enough differentiation from real-world fashion to fully captivate audiences. Some respondents questioned the creative possibilities being underutilized, while others found the rapid changes unsettling rather than exciting. This scepticism raises questions about whether brands are effectively leveraging the unique capabilities of the Metaverse or simply replicating traditional fashion models in a new medium.

As digital fashion continues to evolve, its success may depend on how well it can distinguish itself as a transformative experience rather than just a digital extension of existing trends. The emotional responses to virtual fashion in the Metaverse reveal the complexities of

introducing digital innovation into an industry deeply rooted in tradition. While some viewers were excited by the novelty and creativity of virtual fashion shows, others felt confusion, scepticism, or even detachment. This suggests that digital fashion is still in a transitional phase, where it captivates a niche audience but struggles to engage a broader demographic. The fast-paced and visually dynamic nature of these presentations can be overwhelming for those unfamiliar with digital media, while others view them as an intriguing step toward the future of fashion. However, the challenge lies in making these experiences not only visually compelling but also emotionally engaging and meaningful to a wider audience.

The responses also highlight a divide between those who see virtual fashion as an innovative, forward-thinking movement and those who perceive it as lacking authenticity or emotional depth. While digital craftsmanship and technological advancements impress some, others remain indifferent, feeling that these shows do not add much to their understanding or appreciation of fashion. This suggests that for virtual fashion to gain wider acceptance, it must offer more than just spectacle, it needs to evoke a deeper connection with its audience, whether through storytelling, interactivity, or a stronger link to real-world fashion culture.

The emotional reactions to fashion in the Metaverse clearly reflect a generational divide, with younger participants displaying more intense emotional engagement, ranging from curiosity to discomfort, while older individuals tend to approach the experience with more skepticism or indifference. This age-related distinction may be rooted in differing levels of familiarity with digital technology and expectations about fashion. Younger audiences, despite being more immersed in digital environments, may still find the rapid advancements in virtual fashion overwhelming or difficult to fully embrace. In contrast, older individuals, with their more established views on traditional fashion, may be more critical of digital fashion's authenticity and relevance, finding it harder to connect with these virtual representations in meaningful ways.

In addition to that, the emotional responses to virtual fashion are also influenced by participants' professional interests and personal engagement with the fashion industry. Those with a background or personal interest in design and branding tend to have more positive or curious reactions, seeing the potential for innovation within the Metaverse. For them, the digital world offers new avenues for creativity and experimentation, making it an exciting space for fashion to evolve.

On the other hand, individuals without a strong interest in fashion were generally indifferent or disengaged, suggesting that for virtual fashion to appeal to a wider audience, it must transcend niche interests and resonate with broader cultural values and emotions. Furthermore, the attraction to the technical aspects of virtual fashion shows points to a

growing intersection between fashion and digital media, where the focus on visuals and effects can engage even those who are not inherently interested in fashion itself.

While the study provides valuable insights into emotional engagement with virtual fashion in Metaverse, several limitations should be acknowledged. First, the sample size was relatively small and homogeneous, consisting primarily of master's students in their twenties, which may limit the generalizability of the findings. Second, the study focused on a single one-minute video, which may not fully capture the diversity of virtual fashion experiences. Third, the use of facial expression analysis, while innovative, may not account for internal emotional states that are not visibly expressed. Fourth, the qualitative interviews, although rich in detail, were limited to ten participants and may not reflect broader public perceptions. Additionally, the participants did not possess a professional background in fashion, technology, or digital media, which may have influenced their ability to critically assess the content and its implications. This lack of domain-specific expertise could have affected the depth of engagement and interpretation of the virtual fashion experience, suggesting that future studies should consider including individuals with relevant professional or creative experience for a more comprehensive perspective.

This research contributes to the growing body of literature on digital consumer behavior and emotional engagement in virtual environments. By combining biometric analysis with qualitative methods, the study demonstrates the value of interdisciplinary approaches in understanding user experience. It also highlights the complexity of emotional responses to digital fashion, suggesting that affective engagement in the Metaverse is influenced by generational, professional, and personal factors. These findings support the need for more nuanced theoretical models that account for the interplay between technology, emotion, and cultural context.

Emotional engagement data can inform the design of more compelling virtual fashion experiences, emphasizing elements that resonate with audiences. Brands should consider investing in immersive technologies and storytelling techniques that go beyond visual spectacle to create meaningful interactions. Additionally, understanding the diverse reactions to digital fashion can help brands tailor their strategies to different audience segments, balancing innovation with authenticity to maintain relevance across generational and cultural divides.

Future studies could expand the sample to include participants from diverse age groups, including both significantly younger and older individuals than those in their twenties, to better understand generational differences in emotional engagement with virtual fashion. Additionally, incorporating participants with varying levels of interest and familiarity with

technology from tech enthusiasts to those who are generally disengaged from digital platforms would allow for a more nuanced understanding of how digital literacy and personal attitudes toward technology influence perception and emotional response.

A more heterogeneous sample in terms of cultural background, professional orientation, and lifestyle would also enhance the generalizability of findings and provide deeper insights into how different segments of the population interact with fashion in the Metaverse.

Moreover, future research could benefit from using a longer and more complex stimulus, such as an extended virtual fashion show or interactive digital experience. This would allow researchers to observe whether participants adapt over time, becoming more emotionally engaged as they become familiar with the format and environment. Such longitudinal exposure could reveal patterns of emotional evolution and help determine whether initial skepticism or confusion gives way to appreciation and deeper engagement.

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APPENDICES

Appendix 1: Povzetek (Summary in Slovene language)

Metaverzum predstavlja četrti val tehnoloških inovacij, ki sledi osebnim računalnikom, internetu in mobilnim napravam. Opredeljen je kot trajno, večuporabniško okolje, ki združuje fizično resničnost z digitalno virtualnostjo, ter ponuja poglobljene izkušnje, ki spreminjajo način komuniciranja, dela, učenja in zabave. Še posebej se izpostavlja njegov potencial za revolucijo v izobraževanju in uporabniški izkušnji.

V metaverzumu uporabniki raziskujejo digitalne svetove z uporabo avatarjev – virtualnih ljudi, ustvarjenih z naprednimi tehnikami umetne inteligence (UI) in 3D-modeliranja. Ti avatarji simulirajo videz in čustva ljudi, s čimer izboljšajo interakcijo in občutek prisotnosti. Napredek v sledenju gibanja, prepoznavanju obrazov in obdelavi naravnega jezika je močno pospešil razvoj realističnih avatarjev. V svetu mode in spletnega nakupovanja te virtualne podobe delujejo kot modeli, vplivneži in prodajni svetovalci, kar prispeva k večji personalizaciji in povezavi z blagovnimi znamkami.

Metaverzum prav tako preoblikuje odnose med blagovnimi znamkami in potrošniki z omogočanjem poglobljenih trženjskih izkušenj. Podjetja uporabljajo avatarje, umetno inteligenco in elemente igrifikacije za prispeva k večji interakciji in zvestobi potrošnikov. Modna revolucija v digitalnem svetu odpira nove dimenzije nakupovanja – presega fizične meje in omogoča uporabnikom, da v realnem času preizkušajo virtualna oblačila. Te izkušnje omogočajo tehnologije UI ter obogatene in navidezne resničnosti, zaradi česar postane nakupovanje bolj interaktivno in čustveno doživetje.

Generacija Z ima ključno vlogo v tej digitalni preobrazbi. Kot strokovnjaki digitalne industrije si prizadevajo ustvarjati uporabniške izkušnje, ki združujejo tehnološko dovršenost in čustveno globino v skladu z vrednotami).

Blagovne znamke morajo zadostiti njihovim visokim standardom glede trajnosti, pristnosti in brezhibnosti. Platforme kot so ZEPETO, Roblox in trgovanje z NFT-ji to spremembo že odražajo, saj omogočajo neposredno vključenost in ustvarjalno izražanje skozi avatarje in digitalno modo.

Luksuzne blagovne znamke so metaverzum že sprejele kot novo tržišče. Bulgari je na primer predstavil umetniško izkušnjo, podprto z UI in NFT-ji, Gucci pa je s svojo virtualno izkušnjo na Robloxu pritegnil milijone uporabnikov. Poročilo svetovalnega podjetja Bain razkriva, da kar 70 % luksuznih nakupov predhodno vključuje digitalno interakcijo, kar kaže na pomen kakovostne in privlačne virtualne prisotnosti blagovnih znamk.

Čustva igrajo ključno vlogo pri ustvarjanju poglobljene in kakovostne uporabniške izkušnje. Afektivno računalništvo, ki se odziva na čustvena stanja uporabnikov, pogloblja interakcijo uporabnikov, še posebej v digitalni modi. Teorije iz nevroznanosti in psihologije (Ekman,

Damasio, Mesquita) poudarjajo prilagodljivost, kulturno pogojenost in biološke osnove čustev. V metaverzumu so čustveni odzivi na avatarje, oblačila in digitalna okolja primerljivi z resničnimi, kar ustvarja močne psihološke in fiziološke učinke.

Metaverzum združuje UI, AR, blockchain, NFT-je in igre v enoten digitalni ekosistem, ki spreminja modno industrijo na vseh ravneh. Digitalna identiteta in samoizražanje postajata ključna. Z večjo dostopnostjo metaverzum obeta novo definicijo doživljanja mode ter odpira nove poti za ustvarjalnost, povezovanje in trgovino.

Appendix 2: Interview Questions

Basic Question

1. What is your previous knowledge or experience with Metaverse?

Dimensions of Experience

Perception

1. What did you learn from watching the fashion show?
2. How does it compare to watching a fashion show in person?

Sense

1. Did the models in the video appear lifelike or have a sense of depth? What made you feel that way?
2. How would you describe the visual qualities of the models and their outfits?
3. How would you describe the music played during the fashion show?
4. Could you describe the form and appearance of the stage, background, and props?

Emotion

1. How did the show make you feel afterward?
2. Did any specific images or thoughts come to mind while watching? What do you think triggered them?
3. What was the most unforgettable aspect of the video, and how did it make you feel? Please explain.
4. Did any part of the show evoke a sense of excitement or anticipation? What moment or detail triggered that feeling?
5. Did anything surprise or intrigue you during the show?

Behavior

1. Has your perception of the brand or design changed after watching the show? If so, how?
2. Was there anything that especially caught your attention during the video?

Aesthetic

1. Please describe any physical characteristics you noticed in the models, stage, background, and runway. Was anything particularly striking? Why?
2. Did you feel like you were attending the fashion show with others? Why or why not?
3. Did you experience a sense of presence at the fashion show?