Digital business model innovation in metaverse: How to approach virtual economy opportunities

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ABSTRACT

In recent times, continuous evolutions in digital technologies are triggering new business models (BMs) within virtual environments. This phenomenon is defining a new economy staging in so-called metaverses. Here, physical-world BMs are modified, virtual-world BMs are implemented, and combinations of physical-world and virtual-world BMs are performed. As a result, new mechanisms of value creation and value capture at the crossroads of physical and virtual economies arise in the metaverse. This paper aims at understanding which are these value mechanisms and how organizations can develop them. To this aim, the paper analyzes the cases of four cross-industry incumbents (namely, Gucci, Samsung, Hyundai, and Nike), which are pivoting their BMs in the metaverse. A framework indicating how to innovate BMs in the metaverse is provided, by looking at both "phygital" transformations (i.e., transformations aimed at joining physical and digital worlds' realities) and completely virtual immersions shaping firms' internal processes and relationships with customers. In this way, the paper supports companies in turning the metaverse into value, while also extends the scant academic knowledge on the metaverse' impact on innovation of BMs.

1. Introduction

Business models (BMs) represent valuable means to profit from technological developments or innovative ideas (Teece, 2010; Rachinger et al., 2019; Li, 2020), allowing to create and capture value from digital entrepreneurial initiatives (Kraus et al., 2019; Bican et al., 2020; Sahut et al., 2021).

In particular, BMs based on digital technologies and within digital environments are increasingly spreading to facilitate product/ service offerings, collaborations, and transactions (D'Ippolito et al., 2019) through new interaction modalities within community-based and crowd-based contexts (Mir & Hassan, 2018). Such digital BMs are challenging and innovating traditional market dynamics (Lee, 2011), being able to assure success and profit increase even in dynamic and unforeseen business conditions (Mancuso et al., 2023a).

Therefore, the digital innovation of BMs has won the attention of both scholars and practitioners (Jingyao et al., 2022), especially in most recent times. In fact, the digitalization wave brought by Covid-19 and the current cost reduction in digital hardware and software have enlarged interest about innovations of BMs conducted in digital and virtual environments (Accenture, 2022; Moy & Gadgil, 2022; Ghose et al., 2022). This trend is recently resulting in the definition of a new economic approach based on completely virtual interactions within the so-called metaverses (Cheng et al., 2022).

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Metaverses have been defined for 30 years by science fiction novel (Stepherson, 1992) and rose to prominence at the end of 2021 with investments conducted by big companies leveraging both digital (e.g., Meta, Apple, Microsoft) and non-digital (e.g., Nike, BMW, Gucci) BMs (Ghose et al., 2022; Accenture, 2022). Metaverses are immersive and shared virtual worlds where users, represented by avatars, can interact with each other and with virtual assets and services (Vidal-Tomás, 2022; Madiega et al., 2022; Joy et al., 2022). In these worlds organizations and individuals can create and capture value by carrying out different activities at the edge of the real and virtual worlds. Such activities include study and work, socialization and attendance of experience-driven events, as well as performance of crypto-based transactions for business-to-business and business-to-consumer markets (Kshetri, 2022; Elmasry et al., 2022; Jung & Jeon, 2022; Yang et al., 2022) .[1]

Given the significant economic, social, and policy implications (Bourlakis et al., 2009), the metaverse market is constantly growing (Stackpole, 2022) with the potential to reach 13 trillion of dollars and five billion of total users by 2030 (Ghose et al., 2022). The reason behind the relevant evaluation of the market is that metaverses, as combinatorial innovations, mix multiple new technologies and trends (Gupta, 2022) such as augmented and virtual reality, blockchain, and Web 3.0, all affecting different business aspects. These aspects include more direct firm-customer interactions, operational improvement in staff training and work operations, and better-tailored offer and distribution of products and services (Accenture et al., 2022; Hall & Li, 2022; Abovitz et al., 2022). Hence, metaverses allow to transform BMs of organizations belonging to different settings and industries (Accenture, 2022). In fact, new digital business assets and value exchange configurations released by the metaverse (Hall & Li, 2022; Furlonger et al., 2022) allow to reshape, evolve, and extend traditional digital and non-digital BMs (Accenture, 2022; Moy & Gadgil, 2022; Moro Visconti, 2022). For this reason, in the recent years there have been continuous and constant interests, investments, and discussions both in the academic and managerial fields towards metaverses (Accenture, 2022; Madiega et al., 2022; Kshetri, 2022; Stackpole, 2022). At this regard, valuable is the change of "Facebook" company name in "Meta" to signal the future vision towards virtual worlds, as well as the opening of virtual businesses by traditional products and services companies such as J.P. Morgan,[2] Coca-Cola,[3] and Dyson,[4] that leveraged the efforts of the more than 500 companies working on the metaverse growth (as June 2022) .[5]

However, although the enormous promise (Hwang & Chien, 2022), the concept is so new that significant gaps in understanding the prospects and implications of metaverses remain Xu et al. (2022); Madiega et al. (2022); Moro Visconti (2022), especially in terms of digital innovation of BMs (Furlonger et al., 2022; Tajvidi & Tajvidi, 2020). Indeed, the previous research approached the study of the metaverse through literature reviews aimed at defining the metaverse (e.g., Ritterbusch & Teichmann, 2023), as well as framing the opportunities and challenges that the metaverse introduces in a variety of sectors (e.g., tourism, health, education) and disciplines (e.g., marketing, operations, commerce) (Buhalis et al., 2022; Dwivedi et al., 2022). Such articles explored the governance, security, and safety in the metaverse, as well as the behavioral and social implications of the metaverse. However, business and economic aspects explaining how firms can create and capture value in the metaverse, thus achieving sustained profitability in virtual worlds, are still unclear. Indeed, scholars recognized the metaverse's potential to change BMs, as it enables a range of new digital offerings in virtual-to-virtual, virtual-to-physical, physical-to-virtual, or blurred contexts (Dwivedi et al., 2022; Weking et al., 2023). Accordingly, given the multifold opportunities for firms to monetize in the metaverse, "organizations are starting to assess the potential of the metaverse and how it can be integrated within their existing business models" (Dwivedi et al., 2022, p. 2). Nevertheless, Dwivedi et al. (2022) in their wide research agenda ask for future research to investigate "how can a brand develop metaverse business models". To answer this inquiry, firms need to understand which are the new value creation and capture mechanisms characterizing BMs in the metaverse. In this way, managers can obtain an extensive knowledge through which design and develop new BMs in the metaverse.

Therefore, this paper aims to drill into the current limited knowledge of metaverses, by providing a look at the innovation trajectories of BMs. Specifically, the research question driving the paper is: *"Which new mechanisms of value creation and capture arise from metaverse opportunities?"*.

In order to answer this question, a qualitative multiple case study methodology has been implemented (Yin, 2014). Through the study of four cases (i.e., Nike, Gucci, Samsung, Hyundai), the paper indicates the new value creation and capture mechanisms arising from five specific metaverse opportunities. Specifically, the five metaverse opportunities releasing the new value mechanisms have been clustered around the two main concepts traditionally defining BMs (Frank et al., 2019), i.e., the internal processes and the customers.

Three metaverse opportunities oriented towards internal processes have been retrieved. These three metaverse opportunities pertain with products and channels features and are related to: i) an enhanced product offering bundle (i.e., consisting in the creation of a mixed offering containing both physical and digital products and providing increased benefits in virtual and/or physical worlds), ii) the performance of mixed interaction modalities in traditional channel (i.e., consisting in the extension of physical and/or

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[1] By 2026, 25% of people will spend at least one hour a day in the metaverse for work, shopping, education, social media and/or entertainment (Gupta, 2022).

[2] Finance Monthly (2022), "JPMorgan Is The First Major Bank To Join The Metaverse – Here's Why", available at: https://www.finance-monthly.com/2022/03/jpmorgan-is-the-first-major-bank-to-join-the-metaverse-heres-why/ (accessed 29 March 2023).

[3] Tulfa (2022), "From Metaverse to Reality: Coca-Cola Introduces First Ever Virtual Reality Drink", available at: https://tulfa.com/from-metaverse-to-reality-coca-cola-introduces-first-ever-virtual-reality-drink/ (accessed 29 March 2023).

[4] Breaking Latest News (2021), "Dyson has opened a shop in the metaverse", available at: https://www.breakinglatest.news/health/dyson-has-opened-a-shop-in-the-metaverse/ (accessed 29 March 2023).

[5] VentureBeat (2022), "Newzoo: More than 500 companies are building the metaverse", available at: https://venturebeat.com/2022/06/28/newzoo-more-than-500-companies-are-building-the-metaverse/ (accessed 29 March 2023).

traditional digital channels with totally virtual ones, thus releasing omnichannel benefits), and iii) the augmentation of physical products as new channels (i.e., consisting in the introduction of new features assumable by not metaverse-native physical products to experience virtual worlds). These three metaverse opportunities oriented towards internal processes innovate value creation and value capture mechanisms through a so-called "phygital" transformation aimed at joining physical and digital worlds' realities.

Two metaverse opportunities oriented towards customers are reported. These two metaverse opportunities regard i) virtual identities affirmation (i.e., consisting in the possibility for clients to build their own identity in virtual worlds through avatars and digital objects), and ii) virtual co-creation of value and community building (i.e., consisting in the increase of customers' participation and their interactions, both with each other and with the brand, in virtual worlds). These two metaverse opportunities innovate value creation and capture mechanisms by allowing customers' immersion in totally digital and virtual worlds.

With these results, the paper helps to fill the gap in understanding how the innovation of traditional BMs can occur to seize metaverses opportunities (Furlonger et al., 2022), both from an academic and practical points of view.

Specifically, from a theoretical standpoint, three main contributions arise from our paper.

First, we draw on digital BMI literature to emphasize the value mechanisms released by the metaverse. Accordingly, we contribute to the comprehension of digital BMI in settings characterized by huge level of social and crowd participation (Bourlakis et al., 2009; Hinings et al., 2018; Kraus et al., 2022), as the metaverse ones. In such contexts, we detailed the configurations of customers-customers and brand-customer relationships needed to create and capture value.

Second, we contribute to the few papers exploring the metaverse from a business model perspective (e.g., Mancuso et al., 2023b). The novel implications from our study lie in the definition of five opportunities for digital BMI in the metaverse, as well as in the framing of the specific value creation and capture mechanisms released by the five opportunities.

Third, the present paper presents two main contributions to the information system research (e.g., Wang et al., 2023). First, we recognize the role of partnerships with technical information systems' providers for launching digital initiatives in the metaverse. Second, the paper investigates how social interactions and user communities shape the design of information systems, e.g., through definition of incentives (e.g., airdrop) to influence users' behavior in the metaverse.

Managerial implications are also released by the study. Strategy managers are advised with the understanding of the two main transformations that they can navigate to digitally innovate their BMs in the metaverse. These transformation are the "phygital" transformation of products, channels, and product+channels features and the virtual transformation of users' identities, co-creation logics, and communities. Furthermore, information system managers are supported in designing virtual scenarios. We recommend managers to build virtual scenarios where fostering user communities and implementing effective feedback mechanisms to enhance user satisfaction and loyalty.

With its theorical and managerial contributions, the present paper aims at breaking down one of the most important barriers to the real expansion and adoption of metaverses by companies, that is how to leverage the metaverse for digital BMs innovation (Elmasry et al., 2022).

The paper is structured as follows. Section 2 reviews the theoretical underpinning of digital BMs innovation and metaverses. Section 3 explores the adopted multiple case study methodology. Section 4 analyses the digital BMs innovation undertaken by Nike, Gucci, Samsung, and Hyundai cases. Section 5 discusses the systematization of value creation and capture mechanisms arising from metaverse opportunities, concluding with implications, limitations, and future research avenues.

2. Theoretical background

2.1. Digital business model innovation

The notion of BM has distant origins in time and results from over twenty years of elaboration by scholars (Amit & Zott, 2020), passing through many and different conceptualizations (Zott et al., 2011; Massa et al., 2017). A common description of BMs, which will also be used in this study, focuses on the capacity of BMs to explain a firm's logic for creating and capturing value (Teece, 2010; Zott et al., 2011, 2018). Indeed, a BM identifies the sets of activities, competencies, and resources that on the one hand contribute to value creation as a response to unmet customer needs, and on the other hand allow to capture the created value by converting customers' return for the value received to monetary and non-monetary profit (Teece, 2010, 2018; Chesbrough et al., 2018).

The notion of BM has piqued the interest of academics and executives because it unleashes the value inherent in digital technologies through their effective development and delivery to the market (Zott et al., 2011; Zhang et al., 2016; Gregori & Holzmann, 2020; Ciasullo & Lim, 2022).

In fact, digital technologies represent a valuable mean to create and capture new value (Teece, 2018; Rachinger et al., 2019; Mancuso et al., 2023a), thus enabling digital BM innovation (digital BMI) which concertizes in the update and formulation of new BMs (Amit & Zott, 2001; D'Ippolito et al., 2019).

In particular, digital technologies bring two main effects on traditional BMs' value creation and capture mechanisms, thus enabling digital BMI.

On the one hand, digital technologies have the potential to alter the structure and mixture of traditional products, services, and processes (Parida et al., 2019). This is possible through dematerialization, personalization, and experience-transformation of physical offerings, that reduce transaction costs, enhance revenues, and create new income sources (Parida et al., 2019; Vaska et al., 2021).

On the other hand, digital technologies are leveraged to provide the essential infrastructure for breaking down social, technical, and geographical barriers between customers and firms, thus innovating interaction and networking modalities among them (Mancuso et al., 2023a). As a result, digital BMs leverage more direct channel to strengthen value communication (Parida et al., 2019),

better understand customer needs (Vaska et al., 2021) and co-create new value (Klos et al., 2021), hence allowing to monetize network effects (Lee, 2011).

Therefore, digital BMs leverage digital technologies as a strategic driver (Mancuso et al., 2023a) for transforming products, services, and operations activities (Amit & Zott, 2001; Zhang et al., 2016), thus sustaining revenue growth, competitive advantage, and performance improvement (Zhang et al., 2016; Li, 2020). Accordingly, academic and industrial actors are now more and more interested in understanding how to start digital BMI pathways (Parida et al., 2019; Bosler et al., 2021), investigating how digital technologies can be used to create and capture new value (Teece, 2018; Rachinger et al., 2019; Li, 2020). In this context, exemplar are the experiences of companies such as Apple, Netflix, Amazon, and Google, who profit from the emerging technology of the Internet to successfully innovate traditional BMs (Zhang et al., 2016; D'Ippolito et al., 2019). Like all the digital technologies, even the Internet is subject to technological advancements and innovations. More specifically, in recent times the evolution of the Internet is leading to a completely new concept, i.e., the metaverse (Moro Visconti, 2022; Accenture, 2022), which is now being the protagonist of most digital BMI pathways.

2.2. Metaverse

The metaverse is "the internet considered as an imaginary area without limits where [...] humans, as avatars, interact with each other in a three-dimensional space that mimics reality" .[6] The metaverse is one of the technologies with the greatest potential today (Hwang & Chien, 2022; Wang et al., 2021), given the disruptive and unprecedented impact it has on BMI and economy as a whole (Kim, 2021; Abovitz et al., 2022; Moro Visconti, 2022). In fact, the metaverse is significantly different from any other technological predecessor (Hall & Li, 2022), being a combinational innovation[7] of multiple emerging digital technologies such as 6 G, artificial intelligence, virtual reality and blockchain Wang et al. (2021); Gupta, (2022); Lin, (2022).

Considered the next evolution of the Internet (Moro Visconti, 2022; Accenture, 2022), the metaverse concept has been formulated for at least thirty years and has concretized in the form of multiplayer online games in the past (Moro Visconti, 2022; Jung & Jeon, 2022). However, only the combination of most recent technological advancements, technologies' cost reduction, and shift towards a digital society, endured in last years and strongly accelerated by the Covid-19 pandemic, has unleashed the real concretization of the metaverse (Lin, 2022; Moro Visconti, 2022; Jung & Jeon, 2022; Ghose et al., 2022).

In fact, thanks to new technological opportunities, the metaverse is today configured as a continuous and immersive experience within virtual environments hardly distinguishable from the real world (Wang et al., 2021; Moro Visconti, 2022; Vidal-Tomás, 2022). The multi-sensory shared experience is enabled by virtual and augmented technology applications accessible through headsets, consoles, and smartphones, replicating three-dimensional online environments and enhancing real world experiences (Madiega et al., 2022; Kraus et al., 2022; Moro Visconti, 2022). In these worlds, users interact by means of avatars that perform everyday leisure and professional activities in a virtual way (Yang et al., 2022; Iqbal & Campbell, 2022; Hwang & Chien, 2022) or engage in new virtual activities such as the trading of virtual products and services within specific games and marketplaces (Kim, 2021; Madiega et al., 2022; Vidal-Tomás, 2022). Therefore, it is evident that most of the real-world BMs' approaches, including the ones based on advertising, subscriptions, and e-commerce (Moro Visconti, 2022; Moy & Gadgil, 2022; Hall & Li, 2022) can be replicated into the metaverse (Accenture, 2022), while new types of BMs emerge (Furlonger et al., 2022; Madiega et al., 2022) to feed totally new virtual markets and reach a larger audience with proper offerings (Moro Visconti, 2022; Moy & Gadgil, 2022).

The new metaverse BMs are characterized by innovations in value creation and capture mechanisms, influencing both virtual and physical BMs (Accenture, 2022). These innovations concern two main elements defining BMs, i.e., the offerings and the interaction modalities.

First, metaverse BMs are based on two main types of new offerings at the boundary between real and virtual worlds. First, there is the virtual promotion of real-world products through the sale of a virtual model corresponding to a real and unique object (Bolton & Cora, 2021). Second, there is the offering of virtual goods, contents, and services (Hall & Li, 2022) existing only in the virtual realm (Bolton & Cora, 2021; Ghose et al., 2022) and unrepeatable in the real world due to physical constraints (Moro Visconti, 2022; Moy & Gadgil, 2022).

Second, BMs in the metaverse are enhanced by new interaction modalities (Furlonger et al., 2022) with plenty of opportunities for novel social networking and community development (Hwang & Chien, 2022; Abovitz et al., 2022; Moy & Gadgil, 2022). In these environments, cryptocurrencies and NFTs represent the main elements enhancing both commercial transactions and a deeper connection between firms and customers (Yang et al., 2022; Zarifis & Castro, 2022), thus enabling new BMs (Zarifis & Cheng, 2022).

Downstream the review, it is evident that digital BMI is gaining continuous interests both in academia and industry (Parida et al., 2019; Amit & Zott, 2020) and among the vast opportunities brought by digital technologies in BMs (Lin, 2022) metaverses represent a fascinating and promising topic. Indeed, the newness of the technology and the disruptive impact on whole economies (Iqbal & Campbell, 2022) triggered scholars and practitioners in the comprehension of the metaverse functioning (Bourlakis et al., 2009; Wang et al., 2021; Kshetri, 2022; Mancuso et al., 2023b).

Nevertheless, although there are some commonalities in relation to the management of business within metaverses compared to

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[6] Cambridge Dictionary (2022), "Metaverse", available at: https://dictionary.cambridge.org/dictionary/english/metaverse (accessed 29 March 2023).

[7] A combinatorial innovation is the integration of multiple modules of different digital technologies with embedded digital capabilities (Yoo et al., 2012; Ciriello et al., 2018), which is recognized to be the essence of the metaverse (Gupta, 2022).

traditional forms (Tajvidi & Tajvidi, 2020), the metaverse concept is still quite unknown since its uniqueness and complexity (Xu et al., 2022; Madiega et al., 2022; Visconti, 2022). In this context, research aimed at defining BMI in such type of digital environments based on high social and crowd involvement is needed (Bourlakis et al., 2009; Hinings et al., 2018; Kraus et al., 2022). Therefore, the main research question of the paper is:

"Which new mechanisms of value creation and capture arise from metaverse opportunities?"

3. Research methodology

A multiple case study technique was used to answer the research issue (Yin, 2014). This is a tool for investigating new and complicated phenomena such as digital BMI (Bican et al., 2020; Bosler et al., 2021) and the metaverse (Kraus et al., 2022). Indeed, given this highly novel setting marked by a lack of knowledge on the metaverses' underpinnings, the results from diverse cases might aid in theory development (Eisenhardt 1989).

3.1. Sample

To achieve the research goal, four cases (Nike, Gucci, Samsung, and Hyundai) were chosen. The sample was done using a stringent and severe selection approach using the six criteria formulated by Miles and Huberman (1994) for qualitative research.

First, the cases that have been chosen are pertinent to our research question as they operate in the metaverse. Hence, the analysis of the cases is able to answer to the research question (Miles & Huberman, 1994).

Second, the sample generates rich information on the phenomena under investigation in this study (Miles & Huberman, 1994), as the four firms have built solid roadmaps and performed multifold investments in the metaverse. In this sense, their innovation towards the metaverse is more than a spot initiative, as it is conceived as a reasoned digital BMI.

Third, the sample actually supports generalizability of results (Miles & Huberman, 1994) in two main ways. On the one hand, the four firms present headquarters ranging from Western to Eastern countries (i.e., Gucci is based in Italy, Samsung and Hyundai are based in Seoul, Nike is based in United States) and operate worldwide, with most of metaverse initiatives promoted from different geographical divisions. On the other hand, the cases come from a variety of industries, ranging from fashion and luxury (i.e., Gucci) to high technology (i.e., Samsung), automobile (i.e., Hyundai), and sports (i.e., Nike). The study of these multifold different industries allows to frame the transversal nature of digital BMI. As a result, findings are generalizable as geographic or sector specificities that can modify or skew the results are avoided.

Fourth, the results emerging from our cases are valid and reliable (Miles & Huberman, 1994), as they cover best practices from top organizations that have successfully benefitted from the metaverse. In fact, by means of their approach all the four cases obtained important performance results. Nike Digital, which comprises the company's web3 activities, is the fastest-growing component of the total Nike revenues, accounting for 26% of overall brand sales.[8] Similarly, Gucci's metaverse business reports $11.56 million in total NFT revenue and more than $31 million in sales on secondary markets.[9] Samsung's metaverse strategy was also remunerative, with more than 4 million visits on a branded metaverse in less than a month – the most reached target amongst similar offerings, according to Samsung Electronics.[10] Finally, one of the firsts metaverse moves from Hyundai pertained with a new car buying platform increased digital inquiries from up to 50k visits per week.[11] Hence, the results provided are the reflexion of actions producing real impacts on firms' BMs.

Fifth, the case selection is free from any form of ethical problem (Miles & Huberman, 1994), as none of the author presents a conflict of interest with the four sampled firms.

Sixth the sampled cases positively answer to the practical issues of information accessibility (Miles & Huberman, 1994). Indeed, as they are big companies, the activities related to digital BMI in the metaverse environment were fostered in a variety of ways, though different primary communications formats (e.g., blog posts, video, press release), which are recalled and extended by several secondary sources (e.g., newspapers, magazines). Consequently, the many available secondary sources allowed for sufficient information richness to correctly reconstruct the digital BMI movements.

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[8] The Drum (2022), "Nearly 7 million people have visited Nike's metaverse store", available at: https://www.thedrum.com/news/2022/03/22/nearly-7-million-people-have-visited-nike-s-metaverse-store (accessed 29 March 2023).

[9] Metav.rs (2022), "Top 5 of brands with the most NFT revenue in 2022", available at: https://metav.rs/blog/5-brands-most-nft-revenue/ (accessed 29 March 2023).

[10] Binance (2022), "Samsung's metaverse surpasses 4 million visits in a month", available at: https://www.binance.com/en/news/top/6929280 (accessed 29 March 2023).

[11] Newsweek (2021), "Hyundai Successfully Utilizing Digital Customer Interactions to Target Sales Opportunities" available at: https://www.newsweek.com/hyundai-successfully-utilizing-digital-customer-interactions-target-sales-opportunities-1630191 (accessed 29 March 2023).Autocarpro (2020), "Hyundai India's digital sales platform draws 1.5m visitors and 20,000 enquiries in 4 months" available at: https://www.autocarpro.in/news-national/hyundai-india%E2%80%99s-digital-sales-platform-draws-15m-visitors-and-20-000-enquiries-in-4-months-56732 (accessed 29 March 2023).Collective (n.d.), "Click To Buy", available at: https://www.collectiveworld.com/case-studies/hyundai-click-to-buy.html (accessed 29 March 2023).

3.2. Data collection

After sampling, data about each single case was collected from multiple secondary sources (Table 1). Specifically, information for understanding business context as well as traditional and digital business strategies was taken from official business reports, corporate websites, and academic papers framing cases' digital BMI (e.g., Sepe & Anzivino, 2020; Mishra & Tripathi, 2021; Sharmelly & Ray, 2018; Liu et al., 2021). Alongside to this, documentary information deriving from firms' newsroom sections and official social media pages (i.e., YouTube, LinkedIn, Twitter, Discord profiles) were used to rebuild activities of innovation in value mechanisms from 2021, i.e., the date when the metaverse topic gained major managerial interests (Ghose et al., 2022; Accenture, 2022). These data were crossed with information and interviews coming from newspapers and business magazines (e.g., Forbes, Fortune, CNBC, Bloomberg), as well as from management consulting firms (e.g., McKinsey, Accenture). Although we relied only on secondary sources, we adopted two main expedients to make our study extremely rich and grounded. First, we analyzed posts, reviews, and articles containing declarations of stakeholders involved in the metaverse innovation (e.g., employees, managers, technology partners, trademark attorneys, end users). This improved the trustworthiness of the analysis via firsthand impressions from the main actors that have produced, experienced, or contributed to the metaverse-related innovation. Second, we conducted observations on the usage of the branded metaverse based on secondary photo and video material (i.e., photos on newspapers articles, videos on official and unofficial YouTube channels). This allowed us to have a direct and deep understanding of how the cases innovated BMs' value mechanisms to operate in the metaverse.

3.3. Data analysis

Data collected were triangulated to obtain a robust description of the cases (Yin, 2014), which were analyzed first as single and independent cases and then as elements of a cross-case evaluation (Eisenhardt, 1989). Specifically, the in-depth within-case analysis resulted in a description of cases classifying the firms' actions toward the metaverse according to the value creation and capture framework describing BMs (Teece, 2010, 2018). Instead, the cross-case analysis was achieved through a comparative table resuming similarities and distinctions among the evidence to reach common patterns in digital BMI towards the metaverse. In both the two analyses, authors arrived at final convergence by means of multiple discussion meetings and by means of data coding resulting from the research objective and the digital BMI literature. In fact, the authors leveraged the two first-order data coding categories of "value creation" and "value capture" to conduct the within-case analysis, which were then exploded in second-order themes (e.g., "customization", "co-creation of value") deriving form continuative cross-case analysis. In this way, the enormous information was simply resumed, and discussions, held until common agreement, were facilitated to compare cases with each other and with digital BMI literature.

4. Findings

This section explains digital BMI paths undertaken by Nike, Gucci, Samsung, and Hyundai to operate into the metaverse.

First, within-case descriptions of the digital BMI path performed by each case are provided. Specifically, three sub-sections for each case describe the digital BM adopted in the metaverse, the value creation mechanisms, and the value capture mechanisms.

Second, a comparative cross-case analysis is reported, by contrasting single results in a table.

4.1. Nike

Sports manufacturer Nike has been adopting for many years different technologies, including artificial intelligence and augmented reality, as key features for its business strategy (Liu et al., 2021). Within its digital transformation path, in 2021 Nike definitely moved to the metaverse,[12] after a partnership in 2019 with Roblox, i.e., an online gaming platform for the creation of worlds and games inhabited by customized avatars.[13]

4.1.1. Metaverse BM description

Nike's BM to operate in the metaverse relied upon a virtual world connected with virtual and digital items offering.

Specifically, the 2021 partnership with Roblox allowed Nike to build Nikeland, a proprietary metaverse space on the gaming

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[12] Forbes (2022), "The Amazing Ways Nike Is Using The Metaverse, Web3 And NFTs", available at: https://www.forbes.com/sites/bernardmarr/2022/06/01/the-amazing-ways-nike-is-using-the-metaverse-web3-and-nfts/ (accessed 29 March 2023).
[13] Roblox (2019), "Imagine Bigger, Bolder & Brighter for Nike Air Max Day", available at: https://blog.roblox.com/2019/03/nike-air-max-day/ (accessed 29 March 2023).

Table 1
Data sources.

	SOURCE DESCRIPTION	NIKE	GUCCI	SAMSUNG	HYUNDAI
DATA SOURCES	Official business reports	213 pages (2022 and 2021 Nike Annual reports)	216 pages (2022 and 2021 Kering Annual reports)	692 pages (2021 Samsung Business report and 2022 Samsung Half-year Business Report)	183 pages (2021 and 2022 Hyundai consolidated financial statements)
	Material from corporate websites	Corporate websites (1): 1_https://about.nike.com/en Metaverse-related websites (4): 1_https://www.nike.com/kids/nikeland-roblox 2_https://www.roblox.com/games/7462526249/NIKELAND-NEW 3_https://opensea.io/collection/rtfkt-nike-cryptokicks 4_https://opensea.io/collection/spacedripforging	Corporate websites (2): 1_https://www.gucci.com/us/en/st/about-gucci 2_https://www.kering.com/en/houses/couture-and-leather-goods/gucci/ Metaverse-related websites (7): 1_https://vault.gucci.com/en-US/ 2_https://guccigarden.gucci.com/?y_source=1_MTU1OTM5NTQtNzE1LWxvY2F0aW9uLndlYnNpdGU%3D#/en/ 3_https://www.roblox.com/games/7830918930/Gucci-Town 4_https://opensea.io/collection/superplastic-supergucci 5_https://opensea.io/collection/10ktf-gucci-grail 6_https://www.gucci.com/us/en/st/stories/article/sneaker-garage 7_https://www.gucci.com/us/en/st/stories/inspirations-and-codes/article/zepeto-x-gucci	Corporate websites (3): 1_https://www.samsung.com/us/ 2_https://www.samsung.com/global/ir/ 3_https://www.sammobile.com Metaverse-related websites (4): 1_https://design.samsung.com/global/contents/space-tycoon/ 2_https://www.roblox.com/games/10105990977/FREE-UGC-EVENT-Samsung-Space-Tycoon 3_https://play.decentraland.org/?island=Irdaj&position=103,76&realm=athena 4_www.samsung.com/us/superstargalaxy/	Corporate websites (3): 1_https://www.hyundai.com/worldwide/en/ 2_https://www.hyundaimotorgroup.com/main 3_http://en.hyundai-wia.com/main/main.asp Metaverse-related websites (4): 1_https://www.hyundai-nft.com/ 2_https://www.roblox.com/games/7280776979/Hyundai-Mobility-Adventure 3_https://motorstudio.hyundai.com/zepeto/ln/main.do?strgCd=23 4_https://www.hyundai.com/worldwide/en/brand-journal/mobility-solution/hyundai-metamobility-universe
	Academic papers	3: 1_Liu et al. (2021) 2_Moravcikova and Kliestikova (2017) 3_Holness (2021)	2: 1_Sepe and Anzivino (2020) 2_Holness (2021)	1: Mishra and Tripathi (2021)	1: Sharmelly and Ray (2018)
	Press releases (newsroom section)	6	11	13	9
	Posts on official social media pages	33 videos (YouTube) 16 posts (LinkedIn) 26 statements (Twitter) 1 chat (Discord)	36 videos (YouTube) 17 posts (LinkedIn) 35 statements (Twitter) 1 chat (Discord)	29 videos (YouTube) 4 posts (LinkedIn) 21 statements (Twitter) 1 chat (Discord)	19 videos (YouTube) 6 posts (LinkedIn) 11 statements (Twitter) 1 chat (Discord)
	Articles on newspapers and business magazines	25 Main source link: 1_https://www.forbes.com/ 2_https://www.thedrum.com 3_https://www.psfk.com 4_https://www.cnbc.com 5_https://futurumresearch.com 6_https://www.	32 Main source link: 1_https://www.voguebusiness.com 2_https://www.theverge.com 3_https://mashable.com 4_https://www.luxurydaily.com 5_https://www.highsnobiety.com 6_https://www.jumpstartmag.com 7_https://edition.cnn.com/ 8_https://www.thedrum.com 9_https://www.inputmag.com	28 Main source link: 1_https://www.circle2success.com/ 2_https://www.psfk.com 3_https://metaverseinsider.tech 4_https://www.cryptonewsz.com 5_https://digiday.com 6_https://www.digitaltrends.com 7_https://www.zdnet.com 8_https://breadnews.com/	21 Main source link: 1_https://m.pulsenews.co.kr 2_https://www.engineering.com/ 3_https://iot-automotive.news/ 4_https://www.dpaonthenet.net/ 5_https://techcrunch.com 6_https://www.motortrend.

Table 1 (*continued*)

	voguebusiness.com 7_https://bernardmarr.com 8_https://wwd.com			com 7_https://nftcable.io
Articles from management consulting firms	2: McKinsey: https://www.mckinsey.com/~/media/mckinsey/business%20functions/marketing%20and%20sales/our%20insights/value%20creation%20in%20the%20metaverse/Value-creation-in-the-metaverse.pdf Accenture: https://www.accenture.com/_acnmedia/Thought-Leadership-Assets/PDF-5/Accenture-Meet-Me-in-the-Metaverse-Full-Report.pdf	2 McKinsey: https://www.mckinsey.com/~/media/mckinsey/business%20functions/marketing%20and%20sales/our%20insights/value%20creation%20in%20the%20metaverse/Value-creation-in-the-metaverse.pdf Accenture: https://www.accenture.com/_acnmedia/Thought-Leadership-Assets/PDF-5/Accenture-Meet-Me-in-the-Metaverse-Full-Report.pdf	2 McKinsey: https://www.mckinsey.com/~/media/mckinsey/business%20functions/marketing%20and%20sales/our%20insights/value%20creation%20in%20the%20metaverse/Value-creation-in-the-metaverse.pdf Accenture: https://www.accenture.com/_acnmedia/Thought-Leadership-Assets/PDF-5/Accenture-Meet-Me-in-the-Metaverse-Full-Report.pdf	2 McKinsey: https://www.mckinsey.com/~/media/mckinsey/business%20functions/marketing%20and%20sales/our%20insights/value%20creation%20in%20the%20metaverse/Value-creation-in-the-metaverse.pdf Accenture: https://www.accenture.com/_acnmedia/Thought-Leadership-Assets/PDF-5/Accenture-Meet-Me-in-the-Metaverse-Full-Report.pdf
Photos (unofficial)	13	19	11	9
Video material (unofficial)	15 videos (YouTube)	18 videos (YouTube)	12 videos (YouTube)	8 videos (YouTube)

platform enabling users all around the world to socialize and engage with brand experiences and exclusive digital events.[14] Moreover, visitors can play sport-based mini-games at the boundary of physical and virtual reality, by using accelerometers in their mobile devices to transfer real-world movements in online play.[15] Through play, users can win rewards, virtual products, and materials for building own personal spaces in Nikeland.[16] In addition, visitors can use digital showrooms to buy virtual items representing current and past real-life Nike products.[17]

As Nike moved more deeply into virtual experiences in the metaverse, it built virtual products and services. As part of this, Nike released NFT sneakers collections (i.e., CryotoKicks Dunk Genesis, Space Drip) ,[18] based on Nike real-world sneakers thanks to the acquisition of RTFKT Studios, i.e., a company specialized in NFT creation and digital fashion.[19] Sneakers, first offered to members of the RTFKT community,[20] can be purchased and worn by avatars in the Nikeland metaverse.[21]

4.1.2. Value creation mechanisms

Three value creation mechanisms characterized Nike's digital BM for operating in the metaverse.

First, the Nikeland virtual world on Roblox allowed Nike to test new products and release better offering, since if people "are wearing it on Nikeland, then they will come out with it in the physical world," said Sam Poser, a business analyst.[22]

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[14] The Drum (2022), "Nearly 7 million people have visited Nike's metaverse store", available at: https://www.thedrum.com/news/2022/03/22/nearly-7-million-people-have-visited-nike-s-metaverse-store (accessed 29 March 2023).Psfk (2022), "Nike is taking over the metaverse with direct to avatar sales", available at: https://www.psfk.com/2022/05/nike-is-taking-over-the-metaverse-with-direct-to-avatar-sales.html (accessed 29 March 2023).Futurumresearch (2022), "Nike's Metaverse Store Paves a Pathway into the Future", available at: https://futurumresearch.com/research-notes/nikes-metaverse-store-paves-a-pathway-into-the-future/ (accessed 29 March 2023).YoutTube (2022), "Nike's Amazing Digital Transformation Into The Metaverse", available at: https://www.youtube.com/watch?v=pDoMzUvdVsc&t=147s (accessed 29 March 2023).

[15] Cnbc (2021), "Nike teams up with Roblox to create a virtual world called Nikeland", available at: https://www.cnbc.com/2021/11/18/nike-teams-up-with-roblox-to-create-a-virtual-world-called-nikeland-.html (accessed 29 March 2023).Psfk (2022), "Nikeland - Roblox activation brings the metaverse into the store", available at: https://www.psfk.com/2022/02/nikeland-roblox-activation-brings-the-metaverse-into-the-store.html (accessed 29 March 2023).Inputmag (2021), "Nike jumps into the metaverse with 'Nikeland,' a Roblox virtual world", available at: https://www.inputmag.com/style/nike-nikeland-metaverse-roblox-virtual-world-digital-sneakers-shoes-clothes (accessed 29 March 2023).

[16] Futurumresearch (2022), "Nike's Metaverse Store Paves a Pathway into the Future", available at: https://futurumresearch.com/research-notes/nikes-metaverse-store-paves-a-pathway-into-the-future/ (accessed 29 March 2023).The Drum (2022), "Nearly 7 million people have visited Nike's metaverse store", available at: https://www.thedrum.com/news/2022/03/22/nearly-7-million-people-have-visited-nike-s-metaverse-store (accessed 29 March 2023).Chainstorage (2021), "Nike expands 'metaverse' presence with virtual platform acquisition", available at: https://www.chainstoreage.com/nike-expands-metaverse-presence-virtual-platform-acquisition (accessed 29 March 2023).he Manual (2021), "Nike and Adidas Make Forays Into the Metaverse With New Virtual Spaces", available at: https://www.themanual.com/fashion/nike-and-adidas-metaverse/ (accessed 29 March 2023).

[17] Cnbc (2021), "Nike teams up with Roblox to create a virtual world called Nikeland", available at: https://www.cnbc.com/2021/11/18/nike-teams-up-with-roblox-to-create-a-virtual-world-called-nikeland-.html (accessed 29 March 2023).Forbes (2022), "The Amazing Ways Nike Is Using The Metaverse, Web3 And NFTs", available at: https://www.forbes.com/sites/bernardmarr/2022/06/01/the-amazing-ways-nike-is-using-the-metaverse-web3-and-nfts (accessed 29 March 2023).Tubefilter (2022), "Last year, Nike embraced the metaverse. How's that paying off?", available at: https://www.tubefilter.com/2022/03/23/nike-metaverse-nfts-nikeland-users/ (accessed 29 March 2023).Psfk (2022), "Nikeland - Roblox activation brings the metaverse into the store", available at: https://www.psfk.com/2022/02/nikeland-roblox-activation-brings-the-metaverse-into-the-store.html (accessed 29 March 2023).Inputmag (2021), "Nike jumps into the metaverse with 'Nikeland,' a Roblox virtual world", available at: https://www.inputmag.com/style/nike-nikeland-metaverse-roblox-virtual-world-digital-sneakers-shoes-clothes (accessed 29 March 2023)

[18] VogueBusiness (2022), "Nike and Rtfkt take on digital fashion with first "Cryptokick" sneaker", available at: https://www.voguebusiness.com/technology/nike-and-rtfkt-take-on-digital-fashion-with-first-cryptokick-sneaker (accessed 29 March 2023).HighsNobiety (2022), "RTFKT Continues Its Nft Wins With Space Drip", available at: https://www.highsnobiety.com/p/rtfkt-space-drip-nft/ (accessed 29 March 2023).Psfk (2022), "Nike is taking over the metaverse with direct to avatar sales", available at: https://www.psfk.com/2022/05/nike-is-taking-over-the-metaverse-with-direct-to-avatar-sales.html (accessed 29 March 2023).

[19] Consumer Goods Technology, (2022), "Nike Apps Rocket Fuel for Growth As it Doubles Down On Digital Experimentation", available at: https://consumergoods.com/nike-apps-rocket-fuel-growth-it-doubles-down-digital-experimentation (accessed 29 March 2023).

[20] The Street (2022), "Nike Pulls Out Its First Weapon to Dominate the Metaverse", available at: https://www.thestreet.com/lifestyle/sports/nike-pulls-first-weapon-to-dominate-metaverse-cryptokicks (accessed 29 March 2023).VogueBusiness (2022), "Nike and Rtfkt take on digital fashion with first "Cryptokick" sneaker", available at: https://www.voguebusiness.com/technology/nike-and-rtfkt-take-on-digital-fashion-with-first-cryptokick-sneaker (accessed 29 March 2023).

[21] Intelligent Automation Network (2022), "Nike's Digital Transformation Efforts Continue to Win Big", available at: https://www.intelligentautomation.network/transformation/articles/nikes-digital-transformation-efforts-continue-to-win-big (accessed 29 March 2023).Psfk (2022), "Nike is taking over the metaverse with direct to avatar sales", available at: https://www.psfk.com/2022/05/nike-is-taking-over-the-metaverse-with-direct-to-avatar-sales.html (accessed 29 March 2023).

[22] Cnbc (2021), "Nike teams up with Roblox to create a virtual world called Nikeland", available at: https://www.cnbc.com/2021/11/18/nike-teams-up-with-roblox-to-create-a-virtual-world-called-nikeland-.html (accessed 29 March 2023).

Second, Nike can leverage the virtual business in Nikeland to influence also physical business experience, by replicating in brick-and-mortar stores immersive experiences based on Nikeland. Specifically, through the auxilium of Snapchat Lenses and onsite cameras in a Nike flagship store, shoppers engaged both totally virtual and AR-enabled version of Nikeland's mini-games, designed own mini-games, and customized products before buying.[23] In this way, the new experience promoted by Nike through integration of metaverse and real-life moments allowed the company to pursue an omnichannel strategy,[24] i.e., a business strategy representing the evolution of multichannel strategy and consisting in the provision of fully-integrated experience seamlessly combining multiple touch points (e.g., online, in-store, phone) (Zarifis, 2019).

Third, sneaker NFT collections allowed Nike to create value around customization[25] since every pair of NFT sneakers was fully customizable by purchasers by means of "skin vials", which are special effects and patterns created by designers and artists that can be added to the base sneaker.[26] The extreme personalization gave enhanced value to new and old types of customers, i.e., younger millennials and Generation Z, who traditionally are keener towards one-of-a-kind or customized items,[27] and "athletes and creators at the intersection of sport, creativity, gaming and culture", as remarked by Nike CEO John Donahoe.[28]

4.1.3. Value capture mechanisms

Two value capture mechanisms characterized Nike's digital BM for operating in the metaverse.

First, thanks to the construction of Nikeland virtual world, the company managed to reach the vast young generation audience traditionally engaging in Roblox, thus increasing the attracted customer segments by creating a stronger user familiarity, connection, and finally loyalty.[29]

Second, as noted by Nike CEO John Donahoe, the key revenue strategy for Nike was selling branded NFTs,[30] which can be used to enhance both metaverse and traditional BMs. In fact, on the one hand, the NFT collection CryotoKicks Dunk Genesis was aimed at virtual sales in the metaverse within a direct-to-avatar revenue model,[31] i.e., a revenue model leveraged by brands to sell products and services in virtual worlds where consumers are represented by avatars (Holness, 2021). This new revenue model was enhanced by active user engagement in the virtual world. In fact, users can wear their virtual items as their avatars travel to other Roblox environments – essentially turning the visitors into digital brand ambassadors.[32] Instead, on the other hand, the NFT collection Space Drip gave the opportunity for each NFT to be redeemed for corresponding real-life shoes.[33]

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[23] Psfk (2022), "Nikeland - Roblox activation brings the metaverse into the store", available at: https://www.psfk.com/2022/02/nikeland-roblox-activation-brings-the-metaverse-into-the-store.html (accessed 29 March 2023).Bernard Marr & Co., (2022), "The Amazing Ways Nike Is Using The Metaverse, Web3 And NFTs", available at: https://bernardmarr.com/the-amazing-ways-nike-is-using-the-metaverse-web3-and-nfts/ (accessed 29 March 2023).Chainstorage (2021), "Nike expands 'metaverse' presence with virtual platform acquisition", available at: https://www.chainstoreage.com/nike-expands-metaverse-presence-virtual-platform-acquisition (accessed 29 March 2023).WWD (2022), "Nike Brings Virtual Nikeland/Roblox Experience to NYC Store", available at: https://wwd.com/business-news/technology/nike-nikeland-roblox-nyc-store-metaverse-1235046570/ (accessed 29 March 2023).

[24] Interviewed (2022), "Nike Brings Virtual Nikeland/Roblox Experience to NYC Store – WWD", available at: https://interreviewed.com/nike-brings-virtual-nikeland-roblox-experience-to-nyc-store-wwd/ (accessed 29 March 2023).

[25] Psfk (2022), "Nike is taking over the metaverse with direct to avatar sales", available at: https://www.psfk.com/2022/05/nike-is-taking-over-the-metaverse-with-direct-to-avatar-sales.html (accessed 29 March 2023).

[26] Forbes (2022), "The Amazing Ways Nike Is Using The Metaverse, Web3 And NFTs", available at: https://www.forbes.com/sites/bernardmarr/2022/06/01/the-amazing-ways-nike-is-using-the-metaverse-web3-and-nfts/ (accessed 29 March 2023).VogueBusiness (2022), "Nike and Rtfkt take on digital fashion with first "Cryptokick" sneaker", available at: https://www.voguebusiness.com/technology/nike-and-rtfkt-take-on-digital-fashion-with-first-cryptokick-sneaker (accessed 29 March 2023).CBS News (2022), "Nike's new NFT sneakers selling for more than $100,000", available at: https://www.cbsnews.com/news/nike-cryptokicks-nft-blockchain-metaverse-rtfkt/ (accessed 29 March 2023).YouTube (2022), "RTFKT and Nike CryptoKicks, introduce the Future of Sneakers", available at: https://www.youtube.com/watch?v=h6dtzwMfLa0 (accessed 29 March 2023).

[27] Forbes (2022), "The Amazing Ways Nike Is Using The Metaverse, Web3 And NFTs", available at: https://www.forbes.com/sites/bernardmarr/2022/06/01/the-amazing-ways-nike-is-using-the-metaverse-web3-and-nfts/ (accessed 29 March 2023).

[28] Nike (2021), "Nike Acquires RTFKT", available at: https://about.nike.com/en/newsroom/releases/nike-acquires-rtfkt (accessed 29 March 2023).

[29] YouTube (2021), "Nike partners with Roblox to reach a younger audience", available at: https://www.youtube.com/watch?v=jmx6CdP-m8o (accessed 29 March 2023).Futurumresearch (2022), "Nike's Metaverse Store Paves a Pathway into the Future", available at: https://futurumresearch.com/research-notes/nikes-metaverse-store-paves-a-pathway-into-the-future/ (accessed 29 March 2023).

[30] The Drum (2022), "Nearly 7 million people have visited Nike's metaverse store", available at: https://www.thedrum.com/news/2022/03/22/nearly-7-million-people-have-visited-nike-s-metaverse-store (accessed 29 March 2023).

[31] Psfk (2022), "Nike is taking over the metaverse with direct to avatar sales", available at: https://www.psfk.com/2022/05/nike-is-taking-over-the-metaverse-with-direct-to-avatar-sales.html (accessed 29 March 2023).

[32] Forbes (2022), "The Amazing Ways Nike Is Using The Metaverse, Web3 And NFTs", available at: https://www.forbes.com/sites/bernardmarr/2022/06/01/the-amazing-ways-nike-is-using-the-metaverse-web3-and-nfts/ (accessed 29 March 2023).

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4.2. Gucci

The luxury House Gucci has been a pioneer in digital BMI in the fashion industry,[34] leveraging for a long-time emerging technology (e.g., augmented and virtual reality, artificial intelligence) to create and deliver digital products.[35] As a "first mover" to "challenge the status quo", as told by the CEO Marco Bizzarri,[36] Gucci experimented with the metaverse according to different strands.

4.2.1. Metaverse BM description

Gucci's BM in the metaverse leveraged virtual word experiences, virtual and digital products provision, and physical channel strengthening.

As for virtual worlds, Gucci built (i) a pop-up virtual world on Roblox (i.e., Gucci Garden) hosting a virtual fashion exhibition connected with an in-real-life (IRL) physical exhibition in Gucci's headquarter,[37] (ii) a stable virtual world on Roblox (i.e., Gucci Town) ,[38] and (iii) a proprietary virtual space on Zepeto, i.e., a gaming app and social network where customizable avatars populate virtual worlds.[39]

As for virtual and digital products, the company engaged in the production and sale of an only virtual sneakers collection (i.e., The Gucci Virtual 25) and promoted a co-creation application allowing fans to design their own virtual footwear (i.e., Gucci Sneaker Garage) .[40] Moreover, alongside virtual wearables, Gucci invested in other digital products, by unveiling NFTs representing multifold digital collectibles (i.e., SuperGucci[41]) and images (10KTF Gucci Grail[42]).

As for physical channel strengthening, Gucci empowered its traditional physical channels by accepting cryptocurrency payments in selected stores.[43]

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[34] Medium (2022), "A Deep Dive into Gucci's Metaverse Practice", available at: https://medium.com/marketing-in-the-age-of-digital/a-deep-dive-into-guccis-metaverse-p1ractice-5e38d57eaf26 (accessed 29 March 2023).

[35] Hapticmedia (2021), "What can luxury brands learn from Gucci's digital strategy?", available at: https://hapticmedia.com/blog/what-can-luxury-brands-learn-from-guccis-digital-strategy/ (accessed 29 March 2023).Firstclasse (2022), "Gucci dives deeper into the metaverse with its own town in Roblox", available at: https://firstclasse.com.my/gucci-town-in-roblox/ (accessed 29 March 2023).Medium (2022), "A Deep Dive into Gucci's Metaverse Practice", available at: https://medium.com/marketing-in-the-age-of-digital/a-deep-dive-into-guccis-metaverse-practice-5e38d57eaf26 (accessed 29 March 2023).

[36] Voguebusiness (2022), "Gucci CEO Bizzarri talks metaverse strategy and why it's "already a very real place for us", available at: https://www.voguebusiness.com/technology/gucci-ceo-bizzarri-talks-metaverse-strategy-and-why-its-already-a-very-real-place-for-us (accessed 29 March 2023).

[37] The Verge (2021), "You can now explore a surreal Gucci Garden inside Roblox", available at: https://www.theverge.com/2021/5/17/22440134/gucci-garden-roblox-experience-metaverse-date (accessed 29 March 2023).Voguebusiness (2021), "Inside Gucci and Roblox's new virtual world", available at: https://www.voguebusiness.com/technology/inside-gucci-and-robloxs-new-virtual-world?itm_source=manual_article_recommendation (accessed 29 March 2023).Roblox (2021), "The Gucci Garden Experience Lands on Roblox", available at: https://blog.roblox.com/2021/05/gucci-garden-experience/ (accessed 29 March 2023).

[38] Jumpstartmag (2022), "Gucci Town: What to Expect from the Luxury Brand's Roblox Metaverse", available at: https://www.jumpstartmag.com/what-to-expect-from-the-luxury-brands-roblox-metaverse/ (accessed 29 March 2023).The Verge (2022), "Gucci built a persistent town inside of Roblox", available at: https://www.theverge.com/2022/5/27/23143404/gucci-town-roblox (accessed 29 March 2023).

[39] Gucci (2021), "Zepeto x Gucci", available at: https://www.gucci.com/it/it/st/stories/inspirations-and-codes/article/zepeto-x-gucci (accessed 29 March 2023).

[40] The Popular Times (2022), "Will Consumers Pay for Gucci Sneakers That Don't Exist?", available at: https://www.thepopulartimes.co/articles/gucci-wanna-nft-ar-virtual-sneaker (accessed 29 March 2023).Medium (2021), "Augmented Reality Can Be Real Gucci", available at: https://medium.com/marketing-in-the-age-of-digital/augmented-reality-can-be-real-gucci-304dc41e8551 (accessed 29 March 2023).Gucci (2021), "Gucci Sneaker Garage", available at: https://www.gucci.com/it/en_gb/st/stories/article/sneaker-garage (accessed 29 March 2023).Dezeen (2021), "Gucci releases first virtual sneaker that can only be worn in digital environments", available at: https://www.dezeen.com/2021/03/19/virtual-25-gucci-wanna-digital-sneaker/ (accessed 29 March 2023).The Verge (2021)," Gucci designed virtual sneakers for hypebeasts in Roblox and VRChat", available at: https://www.theverge.com/2021/3/19/22340621/gucci-virtual-25-sneaker-ar-vrchat-roblox (accessed 29 March 2023).Highsnobiety (2020), "ALESSANDRO MICHELE DESIGNED GUCCI'S FIRST VIRTUAL SNEAKER & NOW YOU CAN TOO", available at: https://www.highsnobiety.com/p/gucci-sneaker-garage/ (accessed 29 March 2023).Gucci (2021), "Gucci Sneaker Garage", available at: https://www.gucci.com/it/en_gb/st/stories/article/sneaker-garage (accessed 29 March 2023).

[41] Gucci (2021), "Superplastic and Gucci present Supergucci", available at: https://www.gucci.com/it/en_gb/st/stories/article/supergucci (accessed 29 March 2023).

[42] Gucci (2022), "10KTF Gucci Grail", available at: https://www.gucci.com/it/en_gb/st/stories/article/10ktf-gucci-grail (accessed 29 March 2023).

[43] Mashable (2022), "Gucci will accept cryptocurrency in stores", available at: https://mashable.com/article/gucci-accepting-crypto (accessed 29 March 2023).

4.2.2. Value creation mechanisms

Gucci's BM in the metaverse was defined by two value creation mechanisms.

First, Gucci created new value through active interactions among users and with the brand,[44] allowing people to co-create and affirm their virtual identities[45] inside virtual worlds by means of customization.[46] Specifically, within the Gucci Garden virtual world, users' avatars are represented by genderless mannequins – symbolizing blank canvas – who can absorb elements (i.e., textures) of the exhibition.[47] In this way, users' avatars become one-of-a-kind digital artwork creations[48] and walking Gucci billboards.[49] Similarly, within Gucci's virtual spaces on Roblox and Zepeto, users' avatars can co-create exhibitions and virtual items with Gucci's textures and enjoy exhibitions about Gucci's advertising campaigns.[50] Moreover, also the 10KTF Gucci Grail NFT collection allowed Gucci to create value through unique and personalized outfits for NFT profile photos.[51]

Second, Gucci created value by blurring physical and virtual offerings.[52] In fact, the digital SuperGucci collectibles were accompanied by real world corresponding versions.[53]

4.2.3. Value capture mechanisms

Four value capture mechanisms were implemented in Gucci's metaverse BM.

First, the blurring of physical and virtual experiences within Gucci Garden enhanced value for global "existing and new users",[54] as commented by Morgan Tucker, Roblox senior director of product for the social group.[55] This more accessible and simplified connection with the brand stems from the overcoming of physical reality limits. Indeed, while the physical Gucci Garden experience was limited by

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[44] Voguebusiness (2021), "Inside Gucci and Roblox's new virtual world", available at: https://www.voguebusiness.com/technology/inside-gucci-and-robloxs-new-virtual-world?itm_source=manual_article_recommendation (accessed 29 March 2023).

[45] Gucci (2021), "Gucci Town on Roblox", available at: https://www.gucci.com/it/en_gb/st/stories/article/gucci-town-on-roblox (accessed 29 March 2023).Jumpstartmag (2022), "Gucci Town: What to Expect from the Luxury Brand's Roblox Metaverse", available at: https://www.jumpstartmag.com/what-to-expect-from-the-luxury-brands-roblox-metaverse/ (accessed 29 March 2023).Voguebusiness (2022), "When it comes to Roblox Gucci is not playing around", available at: https://www.voguebusiness.com/technology/when-it-comes-to-roblox-gucci-is-not-playing-around (accessed 29 March 2023).

[46] CrFashionBook (2022), "CHECK OUT GUCCI VAULT'S NEW METAVERSE SHOP PARTNERED WITH 10KTF", available at: https://crfashionbook.com/check-out-gucci-vaults-new-metaverse-shop-partnered-with-10ktf/ (accessed 29 March 2023).

[47] Voguebusiness (2021), "Inside Gucci and Roblox's new virtual world", available at: https://www.voguebusiness.com/technology/inside-gucci-and-robloxs-new-virtual-world?itm_source=manual_article_recommendation (accessed 29 March 2023).

[48] Roblox (2021), "The Gucci Garden Experience Lands on Roblox", available at: https://blog.roblox.com/2021/05/gucci-garden-experience/ (accessed 29 March 2023).Gucci (2021), "Gucci Garden on Roblox", available at: https://www.gucci.com/it/en_gb/st/stories/inspirations-and-codes/article/gucci-gaming-roblox (accessed 29 March 2023).

[49] Highsnobiety (2021), "GUCCI'S RETROSPECTIVE ROBLOX TOUR SOUNDS A BIT WEIRD BUT WE'RE INTO IT", available at: https://www.highsnobiety.com/p/gucci-garden-archetypes-exhibit/ (accessed 29 March 2023).

[50] Hashtaglegend (2022), "Gucci joins the metaverse with a town of its own", available at: https://hashtaglegend.com/culture/metaverse/gucci-joins-the-metaverse-with-a-town-of-its-own/ (accessed 29 March 2023).Jumpstartmag (2022), "Gucci Town: What to Expect from the Luxury Brand's Roblox Metaverse", available at: https://www.jumpstartmag.com/what-to-expect-from-the-luxury-brands-roblox-metaverse/ (accessed 29 March 2023).Tatler (2022), "Gucci is Moving Into Roblox's Metaverse", available at: https://www.tatlerasia.com/style/fashion/gucci-town-roblox-metaverse(accessed 29 March 2023).Roblox (2021), "Gucci Town", available at: https://www.roblox.com/games/7830918930/Gucci-Town (accessed 29 March 2023).Voguebusiness (2022), "When it comes to Roblox Gucci is not playing around", available at: https://www.voguebusiness.com/technology/when-it-comes-to-roblox-gucci-is-not-playing-around (accessed 29 March 2023).The Verge (2022), "Gucci built a persistent town inside of Roblox", available at: https://www.theverge.com/2022/5/27/23143404/gucci-town-roblox (accessed 29 March 2023). Gucci (2021), "Gucci Town on Roblox", available at: https://www.gucci.com/it/en_gb/st/stories/article/gucci-town-on-roblox (accessed 29 March 2023).Chaindecoded (2022), "Gucci partners with Zepeto to host a metaverse exhibition and sell items", available at: https://chaindecoded.com/gucci-partners-with-zepeto-to-host-a-metaverse-exhibition-and-sell-items/ (accessed 29 March 2023).Fashionunited (2021), "Gucci partners with Zepeto to personalise avatars and virtual world", available at: https://fashionunited.uk/news/fashion/gucci-partners-with-zepeto-to-personalise-avatars-and-virtual-world/2021020853455 (accessed 29 March 2023).LuxuryDaily (2021), "Gucci offers consumers stylish avatars in gaming collaboration", available at: https://www.luxurydaily.com/gucci-and-zepeto-offer-consumers-stylish-avatars/ (accessed 29 March 2023).

[51] Gucci (2021), "Gucci Grail", available at: https://vault.gucci.com/en-US/story/gucci-grail (accessed 29 March 2023).CrFashionBook (2022), "CHECK OUT GUCCI VAULT'S NEW METAVERSE SHOP PARTNERED WITH 10KTF", available at: https://crfashionbook.com/check-out-gucci-vaults-new-metaverse-shop-partnered-with-10ktf/ (accessed 29 March 2023).

[52] Gucci (2021), "Metaverse", available at: https://vault.gucci.com/en-US/story/metaverse (accessed 29 March 2023).

[53] Gucci (2021), "Superplastic and Gucci present Supergucci", available at: https://vault.gucci.com/en-US/story/supergucci (accessed 29 March 2023).Yahoo Sports (2022), "Gucci to Release More NFTs, This Time With Superplastic's Animated Celebrities", available at: https://sports.yahoo.com/gucci-release-more-nfts-time-202539865.html (accessed 29 March 2023).Gucci (2021), "FAQ", available at: https://vault.gucci.com/en-US/st/faq (accessed 29 March 2023).

[54] Highsnobiety (2021), "GUCCI'S RETROSPECTIVE ROBLOX TOUR SOUNDS A BIT WEIRD BUT WE'RE INTO IT", available at: https://www.highsnobiety.com/p/gucci-garden-archetypes-exhibit/ (accessed 29 March 2023).Gucci (2021), "Metaverse", available at: https://vault.gucci.com/en-US/story/metaverse (accessed 29 March 2023).The Verge (2022), "Gucci built a persistent town inside of Roblox", available at: https://www.theverge.com/2022/5/27/23143404/gucci-town-roblox (accessed 29 March 2023).Roblox (2021), "The Gucci Garden Experience Lands on Roblox", available at: https://blog.roblox.com/2021/05/gucci-garden-experience/ (accessed 29 March 2023).

[55] Voguebusiness (2021), "Inside Gucci and Roblox's new virtual world", available at: https://www.voguebusiness.com/technology/inside-gucci-and-robloxs-new-virtual-world?itm_source=manual_article_recommendation (accessed 29 March 2023).

capacity constraints (i.e., only a pre-defined number of people can attend the event and they have to be in the physical location where the event is held), the virtual Gucci Garden experience allows for a potentially illimited number of people located anywhere in the world to join the event.

Second, a new direct-to-avatar revenue model emerged,[56] concretizing in sales of Gucci's virtual products to be collected and/or used for outfitting avatars.[57] In particular, this revenue mechanism allowing users to affirm their virtual identities was characterized by two elements. First, gamification was leveraged to increase engagement,[58] allowing Gucci Town' visitors to earn Gucci virtual currency through mini games for unlocking the right to purchase specific items.[59] Second, new pricing strategies were released. On the one hand, the artificial scarcity due to promotion of exclusive and limited-edition virtual products available only in the virtual realm[60] resulted in small-windows high-priced sales.[61] On the other hand, The Gucci Virtual 25 sneakers allowed the sale of low prices virtual products to Generation Z and younger fans who cannot afford high-priced real-life Gucci products but instead can afford low-priced digital pairs to be shared on social networks and metaverse platforms.

Third, the construction of a community fed with "new ideas and visual stimuli", as pointed out by Gucci's Executive Vice President of New Businesses, Nicolas Oudinot,[62] increased brand awareness, engagement, and loyalty, thus turning in potential revenues increase. In particular, Gucci acted on brand rewarding to empower the community, by reserving many NFTs of 10KTF Gucci Grail to individuals showing high community involvement towards Gucci's official profile on Discord (i.e., instant messaging social platform)[63].

Fourth, the acceptance of cryptocurrencies for in-store purchases[64] allowed to extend customer segments. In particular, the company provided an "enhanced [payment] experience", as stated by Marco Bizzarri, Gucci president and CEO,[65] to new addressable customers profiles. These are Gucci's clients particularly familiar with digital technologies[66] and new crypto-invertors, i.e., adopters of cryptocurrency who can re-invest their crypto gains to collect Gucci's luxury items.[67] Moreover, in this way the company promoted user familiarity with crypto-payments also for its traditional clients who may not be accustomed with crypto technologies.

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[56] Roblox (2021), "The Gucci Garden Experience Lands on Roblox", available at: https://blog.roblox.com/2021/05/gucci-garden-experience/ (accessed 29 March 2023).

[57] Hashtaglegend (2022), "Gucci joins the metaverse with a town of its own", available at: https://hashtaglegend.com/culture/metaverse/gucci-joins-the-metaverse-with-a-town-of-its-own/ (accessed 29 March 2023).Jumpstartmag (2022), "Gucci Town: What to Expect from the Luxury Brand's Roblox Metaverse", available at: https://www.jumpstartmag.com/what-to-expect-from-the-luxury-brands-roblox-metaverse/ (accessed 29 March 2023).Tatler (2022), "Gucci is Moving Into Roblox's Metaverse", available at: https://www.tatlerasia.com/style/fashion/gucci-town-roblox-metaverse(accessed 29 March 2023).Roblox (2021), "Gucci Town", available at: https://www.roblox.com/games/7830918930/Gucci-Town (accessed 29 March 2023).Voguebusiness (2022), "When it comes to Roblox Gucci is not playing around", available at: https://www.voguebusiness.com/technology/when-it-comes-to-roblox-gucci-is-not-playing-around (accessed 29 March 2023).The Verge (2022), "Gucci built a persistent town inside of Roblox", available at: https://www.theverge.com/2022/5/27/23143404/gucci-town-roblox (accessed 29 March 2023). Gucci (2021), "Gucci Town on Roblox", available at: https://www.gucci.com/it/en_gb/st/stories/article/gucci-town-on-roblox (accessed 29 March 2023).Chaindecoded (2022), "Gucci partners with Zepeto to host a metaverse exhibition and sell items", available at: https://chaindecoded.com/gucci-partners-with-zepeto-to-host-a-metaverse-exhibition-and-sell-items/ (accessed 29 March 2023).Fashionunited (2021), "Gucci partners with Zepeto to personalise avatars and virtual world", available at: https://fashionunited.uk/news/fashion/gucci-partners-with-zepeto-to-personalise-avatars-and-virtual-world/2021020853455 (accessed 29 March 2023).LuxuryDaily (2021), "Gucci offers consumers stylish avatars in gaming collaboration", available at: https://www.luxurydaily.com/gucci-and-zepeto-offer-consumers-stylish-avatars/ (accessed 29 March 2023).

[58] Marketingdive (2022), "Gucci opens persistent digital space on Roblox", available at: https://www.marketingdive.com/news/gucci-town-roblox-metaverse/624537/ (accessed 29 March 2023).

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[60] The Drum (2022), "We toured Gucci Town, a branded Roblox world – here's our review", available at: https://www.thedrum.com/news/2022/06/13/we-toured-gucci-town-branded-roblox-world-here-s-our-review (accessed 29 March 2023).

[61] Highsnobiety (2021), "GUCCI'S RETROSPECTIVE ROBLOX TOUR SOUNDS A BIT WEIRD BUT WE'RE INTO IT", available at: https://www.highsnobiety.com/p/gucci-virtual-purse-roblox-resale/ (accessed 29 March 2023).Dazed (2021), "A virtual Gucci bag has sold for more than the IRL version", available at: https://www.dazeddigital.com/fashion/article/52929/1/a-virtual-gucci-bag-has-sold-for-more-than-the-irl-bag-roblox (accessed 29 March 2023).

[62] The Verge (2022), "Gucci built a persistent town inside of Roblox", available at: https://www.theverge.com/2022/5/27/23143404/gucci-town-roblox (accessed 29 March 2023).

[63] Voguebusiness (2021), "Gucci goes deeper into the Metaverse for next Nft project", available at: https://www.voguebusiness.com/technology/gucci-goes-deeper-into-the-metaverse-for-next-nft-project (accessed 29 March 2023).

[64] Cnn (2022), "You will soon be able to use Bitcoin to buy Gucci", available at: https://edition.cnn.com/2022/05/08/business/gucci-bitcoin-cryptocurrency-payments-trnd/index.html (accessed 29 March 2023).Inputmag (2022), "Gucci is now accepting BAYC's ApeCoin for in-store purchases", available at: https://www.inputmag.com/style/gucci-apecoin-crypto-bored-ape-yacht-club (accessed 29 March 2023).

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[66] Tatler (2022), "Gucci is Now Accepting Cryptocurrency Payments", available at: https://www.tatlerasia.com/style/fashion/gucci-accepting-cryptocurrency-payments-bitcoin-ethereum (accessed 29 March 2023).

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4.3. Samsung

As a global renowned high-tech company, Samsung has always been engaged in innovations relying upon different digital technologies, e.g., Internet of Things, cloud, big data analytics, artificial intelligence, and blockchain.[68] Recently, Samsung Vice Chairman Han Jong-Hee chose the metaverse as an important new growth area, focusing on the launch of metaverse solutions "to enable customers to experience the new technology wherever they are" .[69]

4.3.1. Metaverse BM description

Samsung innovated its BM by acting on both totally virtual aspects (i.e., virtual world and experiences) and combination of virtual and physical features to spot new interaction modalities in the metaverse.

As regards the digital BMI around virtual world and experience for virtual interaction, Samsung released three initiatives. First, the company released an online game built on Roblox (i.e., Space Tycoon), which allowed users to design and customize virtual Samsung products (e.g., smartphones, TVs, home appliances) .[70] Second, the company launched a virtual store on the blockchain-powered virtual world Decentraland (i.e., Samsung 837X). This store was modeled on Samsung IRL flagship store to communicate latest products and commitments.[71] Third, the company announced a virtual event on Roblox (i.e., Samsung Superstar Galaxy) allowing users to affirm their identities in virtual social context.[72]

As regards the digital BMI around combination of virtual and physical features, Samsung acted on two strands. First, it released exclusive and customized branded NFTs for selected customers purchasing its newest physical smartphones,[73] thus associating a virtual complementary asset to a physical core asset. Second, the company enhanced its physical products with metaverse technology. Specifically, on the one hand, Samsung launched new TV products allowing customers to discover, trade, and show off crypto-art thanks to an intuitive and integrated NFT platform.[74] On the other hand, the company released new versions of smartphone-integrated digital wallet[75] enabling users to support crypto transactions, among others.[76]

[68] Circle2success (2022), "An Interview With Samsung CEO On Driving Digital Transformation Globally", available at: https://www.circle2success.com/an-interview-with-samsung-ceo-on-driving-digital-transformation-globally/ (accessed 29 March 2023).

[69] Sammobile (2022), "Samsung to accelerate R&D of metaverse-related technologies", available at: https://www.sammobile.com/news/samsung-to-accelerate-research-development-of-metaverse-related-technologies/ (accessed 29 March 2023).

[70] Sammobile (2022), "Samsung explains how to experience the fantastic world of Space Tycoon", available at: https://www.sammobile.com/news/samsung-explains-how-to-experience-the-fantastic-world-of-space-tycoon/ (accessed 29 March 2023).Samsung Newsroom (2022), "Samsung Unveils Experiential Virtual Playground 'Space Tycoon' on Roblox", available at: https://news.samsung.com/global/samsung-unveils-experiential-virtual-playground-space-tycoon-on-roblox?utm_source=rss&utm_medium=direct (accessed 29 March 2023).Samsung (2022), "Welcome to Samsung Space Tycoon", available at: https://design.samsung.com/global/contents/space-tycoon/ (accessed 29 March 2023).Samsung Newsroom (2022), "[Interview] Samsung Designers Explain How To Play and Connect With a Brand on Roblox", available at: https://news.samsung.com/global/interview-samsung-designers-explain-how-to-play-and-connect-with-a-brand-on-roblox?utm_source=rss&utm_medium=direct (accessed 29 March 2023).

[71] Psfk (2022), "Samsung Galaxy Debuts New Products In The Metaverse", available at: https://www.psfk.com/2022/02/samsung-galaxy-debuts-new-products-in-the-metaverse.html (accessed 29 March 2023).Samsung Newsroom (2022), "Samsung Debuts New Fan Experience in the Metaverse with Samsung 837X. Here's How to Get In!", available at: https://news.samsung.com/us/samsung-837x-new-metaverse-fan-experience/ (accessed 29 March 2023).Samsung Newsroom (2022), "A Deeper Dive into the Creation of Samsung 837X", available at: https://news.samsung.com/us/creation-of-samsung-837x/ (accessed 29 March 2023).

[72] Samsung Newsroom (2022), "Samsung Superstar Galaxy on Roblox Featuring Pop Icon Charli XCX Now Available for a Limited Time", available at: https://news.samsung.com/global/samsung-superstar-galaxy-on-roblox-featuring-pop-icon-charli-xcx-now-available-for-a-limited-time (accessed 29 March 2023).

[73] The Metaverseinsider (2022), "Theta Labs Inc. Has Partnered with Samsung to Expand its NFT Empire", available at: https://metaverseinsider.tech/2022/02/16/theta-labs-inc-has-partnered-with-samsung-to-expand-its-nft-empire/ (accessed 29 March 2023).Cryptonewsz (2022), "Samsung launches news devices in collaboration with Theta Nfts", available at: https://www.cryptonewsz.com/samsung-launches-new-devices-in-collaboration-with-theta-nfts/ (accessed 29 March 2023).

[74] Digiday (2022), "Samsung turns to Discord to built out its metaverse strategy", available at: https://digiday.com/marketing/samsung-turns-to-discord-to-build-out-its-metaverse-strategy/ (accessed 29 March 2023).Petapixel (2022), "Samsung Explains How It Will Integrate Photo NFTs into its 2022 TVs", available at: https://petapixel.com/2022/04/01/samsung-explains-how-it-will-integrate-photo-nfts-into-its-2022-tvs/ (accessed 29 March 2023).

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4.3.2. Value creation mechanisms

Samsung created value in the metaverse in four ways at the crossroad between physical and virtual worlds.

First, Samsung's virtual world experiences increased active interactions among users and with the brand, by leveraging customization and affirmation of virtual identity in the metaverse.[77] In fact, virtual worlds and stores allowed users to customize and share avatars on social medias, express virtual identity with co-created generative NFT art projects, and showcase own performances or creations to others.[78]

Second, Samsung fostered a new consumer-product interaction modality,[79] since the brand's products in virtual spaces perform different functions as compared to the functions that the products perform in the real life.[80] In fact, Space Tycoon game allowed consumers to leverage IRL products for enhancing virtual game missions, thus transforming physical devices into in-game gadgets. An example is the transformation of real Galaxy phones owned by the user into scooters to be driven in the virtual game.[81] Additionally, also in Samsung 837X people were able to use IRL in-store products to take part in a special event.[82] Specifically, in-store products at the physical Samsung 837 store were leveraged as devices for generating art pieces to be enclosed into a unique generative art mosaic.

Third, Samsung created value through special metaverse-enabled complementary products enhancing IRL products offering.[83] In particular, this is possible by using NFTs to "provide unique customer benefits for pre-ordering Samsung's flagship mobile devices", as remarked by Mitch Liu, Samsung's partner.[84] Hence, users that undertake to order a new Samsung device can obtain a customized NFT.

Fourth, the greater interaction among users on official Discord server around Samsung's innovations shaped focus groups for better understanding customer needs,[85] thus allowing to release better offering. In particular, the audience's size and level of engagement achieved by customers' connection on Discord allow for a better customer understanding. This is the comment by Michelle Crossan-Matos, CMO at Samsung Electronics America, in that regard: "You can put a game in front of them [customers] and you'll tell them how they feel […] We haven't quite figured out yet how to go back to them within the platform. That's why we created Discord to have a conversation with them [customers] and a very open freeway. We've got just under 200,000 users in Discord, and that's like a panel. That's a focus group waiting to happen" .[86]

[77] Sammobile (2022), "Samsung unveils experiential virtual playground space Tycoon on Roblox", available at: https://news.samsung.com/global/samsung-unveils-experiential-virtual-playground-space-tycoon-on-roblox?utm_source=rss&utm_medium=direct (accessed 29 March 2023). Sammobile (2022), "Samsung explains how to experience the fantastic world of Space Tycoon", available at: https://www.sammobile.com/news/samsung-explains-how-to-experience-the-fantastic-world-of-space-tycoon/ (accessed 29 March 2023).Sammobile (2022), "Samsung unveils experiential virtual playground space Tycoon on Roblox", available at: https://www.sammobile.com/news/samsung-unveils-a-new-way-to-interact-with-its-products-on-roblox/ (accessed 29 March 2023).Digitaltrends (2022), "Samsung doubles down on NFTs with digital metaverse adventure", available at: https://www.digitaltrends.com/mobile/samsung-doubles-down-on-nfts-with-digital-metaverse-adventure/ (accessed 29 March 2023).Samsung Newsroom (2022), "Connect and Create at Samsung 837/NEXT During NFT.NYC", available at: https://news.samsung.com/us/samsung-837-next-nft-nyc/ (accessed 29 March 2023).

[78] Samsung Newsroom (2022), "Samsung Superstar Galaxy on Roblox Featuring Pop Icon Charli XCX Now Available for a Limited Time", available at: https://news.samsung.com/global/samsung-superstar-galaxy-on-roblox-featuring-pop-icon-charli-xcx-now-available-for-a-limited-time (accessed 29 March 2023).Samsung Newsroom (2022), "Samsung Fans to Create a Next-Level NFT Mosaic During Samsung's 837/NEXT", available at: https://news.samsung.com/us/samsung-837-next-fans-create-nft-nyc-week-mosaic/ (accessed 29 March 2023).Samsung (2022), "Welcome to Samsung Space Tycoon", available at: https://design.samsung.com/global/contents/space-tycoon/ (accessed 29 March 2023).

[79] Sammobile (2022), "Samsung unveils experiential virtual playground space Tycoon on Roblox", available at: https://www.sammobile.com/news/samsung-unveils-a-new-way-to-interact-with-its-products-on-roblox/ (accessed 29 March 2023).

[80] Samsung Newsroom (2022), "[Interview] Samsung Designers Explain How To Play and Connect With a Brand on Roblox", available at: https://news.samsung.com/global/interview-samsung-designers-explain-how-to-play-and-connect-with-a-brand-on-roblox?utm_source=rss&utm_medium=direct (accessed 29 March 2023).

[81] Samsung Newsroom (2022), "Samsung Unveils Experiential Virtual Playground 'Space Tycoon' on Roblox", available at: https://news.samsung.com/global/samsung-unveils-experiential-virtual-playground-space-tycoon-on-roblox?utm_source=rss&utm_medium=direct (accessed 29 March 2023).Samsung (2022), "Welcome to Samsung Space Tycoon", available at: https://design.samsung.com/global/contents/space-tycoon/ (accessed 29 March 2023).

[82] Samsung Newsroom (2022), "Samsung Fans to Create a Next-Level NFT Mosaic During Samsung's 837/NEXT", available at: https://news.samsung.com/us/samsung-837-next-fans-create-nft-nyc-week-mosaic/ (accessed 29 March 2023).

[83] Nftnewstoday (2022), "Samsung x Theta NFTs collaboration", available at: https://nftnewstoday.com/2022/04/23/samsung-x-theta-nfts-collaboration/ (accessed 29 March 2023).Cryptonewsz (2022), "Samsung launches news devices in collaboration with Theta Nfts", available at: https://www.cryptonewsz.com/samsung-launches-new-devices-in-collaboration-with-theta-nfts/ (accessed 29 March 2023).

[84] The Metaverseinsider (2022), "Theta Labs Inc. Has Partnered with Samsung to Expand its NFT Empire", available at: https://metaverseinsider.tech/2022/02/16/theta-labs-inc-has-partnered-with-samsung-to-expand-its-nft-empire/ (accessed 29 March 2023).

[85] Digiday (2022), "Samsung turns to Discord to built out its metaverse strategy", available at: https://digiday.com/marketing/samsung-turns-to-discord-to-build-out-its-metaverse-strategy/ (accessed 29 August 2022).

[86] Digiday (2022), "Samsung turns to Discord to built out its metaverse strategy", available at: https://digiday.com/marketing/samsung-turns-to-discord-to-build-out-its-metaverse-strategy/ (accessed 29 August 2022).

4.3.3. Value capture mechanisms

The value capture mechanisms retrieved in Samsung's digital BM in the metaverse are three.

The first one was represented by a greater connection between the users and the brand, resulting in increased brand awareness, engagement, and loyalty for a new younger and global customer segment.[87] In fact, through branded virtual world experiences, young consumers largely living virtual platforms[88] "would become closer to Samsung", as explained by Samsung's User Experience designer Soojung Lee.[89] In this way, Samsung cultivated a community. Such community is enhanced through an official Discord server.[90] Discord is a social media mostly used by gamers and youngers to communicate online via voice, video, or text, and join servers gathering larger communities. The Samsung adoption of Discord through the creation and feeding of a Samsung server allows for more frequent and direct engagement with customers through exclusive contents, engagement rewards, and virtual events' promotion.[91]

Second, the company launched a direct-to-avatar revenue model, allowing visitors to purchase products[92] in its virtual worlds as well as to collect in-game currency for improving game experience and customizing avatars.[93]

Third, Samsung released a further revenue channel. This new revenue channel stems from an augmentation of physical assets and is aimed at driving virtual sales as well as making more familiar the adoption of metaverse technology. In fact, the new TVs with NFTs platform and the new smartphone-integrated digital wallet promoted growth and adoption of emerging metaverse technology to a vast user base globally.[94] In fact, the NFT platform was suitable both for non-digital skilled users, since it did not necessarily require owning any cryptocurrency,[95] and for digital experts, who can explore blockchain metadata before purchasing.[96] In the same way, the digital wallet granted blockchain transactions' diffusion thanks to enhanced simplification and security enabled by the new product feature.[97]

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[87] Yohnap News Agency (2022), "Samsung to expedite metaverse technology development", available at: https://en.yna.co.kr/view/AEN20220506005400320 (accessed 29 March 2023).

[88] Yohnap News Agency (2022), "Samsung to expedite metaverse technology development", available at: https://en.yna.co.kr/view/AEN20220506005400320 (accessed 29 March 2023).

[89] Sammobile (2022), "Samsung explains how to experience the fantastic world of Space Tycoon", available at: https://www.sammobile.com/news/samsung-explains-how-to-experience-the-fantastic-world-of-space-tycoon (accessed 29 March 2023).Sammobile (2022), "Samsung unveils a new way to interact with its products on Roblox", available at: https://www.sammobile.com/news/samsung-unveils-a-new-way-to-interact-with-its-products-on-roblox/ (accessed 29 March 2023).Samsung Newsroom (2022), "Samsung Unveils Experiential Virtual Playground 'Space Tycoon' on Roblox", available at: https://news.samsung.com/global/samsung-unveils-experiential-virtual-playground-space-tycoon-on-roblox?utm_source=rss&utm_medium=direct (accessed 29 March 2023).

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[91] Sammobile (2022), "Samsung US launches Discord server to support its Web3 activities", available at: https://www.sammobile.com/news/samsung-us-launches-discord-server-to-support-its-web3-activities/ (accessed 29 March 2023).Digiday (2022), "Samsung turns to Discord to built out its metaverse strategy", available at: https://digiday.com/marketing/samsung-turns-to-discord-to-build-out-its-metaverse-strategy/ (accessed 29 March 2023).Samsung Newsroom (2022), "[Update] Samsung Dives Deeper into the Web 3.0 Space with Discord Launch", available at: https://news.samsung.com/us/samsung-discord-launch-web-3-space/ (accessed 29 March 2023).ZDNet (2022), "Samsung broadens Web 3.0 and metaverse presence with Discord launch", available at: https://www.zdnet.com/article/samsung-broadens-web-3-0-and-metaverse-presence-with-discord-launch/ (accessed 29 March 2023).

[92] Psfk (2022), "Samsung Galaxy Debuts New Products In The Metaverse", available at: https://www.psfk.com/2022/02/samsung-galaxy-debuts-new-products-in-the-metaverse.html (accessed 29 March 2023).Samsung Newsroom (2022), "Samsung Debuts New Fan Experience in the Metaverse with Samsung 837X. Here's How to Get In!", available at: https://news.samsung.com/us/samsung-837x-new-metaverse-fan-experience/ (accessed 29 March 2023).Samsung Newsroom (2022), "A Deeper Dive into the Creation of Samsung 837X", available at: https://news.samsung.com/us/creation-of-samsung-837x/ (accessed 29 March 2023).

[93] Sammobile (2022), "Samsung explains how to experience the fantastic world of Space Tycoon", available at: https://www.sammobile.com/news/samsung-explains-how-to-experience-the-fantastic-world-of-space-tycoon/ (accessed 29 March 2023).Samsung Newsroom (2022), "Samsung Unveils Experiential Virtual Playground 'Space Tycoon' on Roblox", available at: https://news.samsung.com/global/samsung-unveils-experiential-virtual-playground-space-tycoon-on-roblox?utm_source=rss&utm_medium=direct (accessed 29 March 2023).Samsung (2022), "Welcome to Samsung Space Tycoon", available at: https://design.samsung.com/global/contents/space-tycoon/ (accessed 29 March 2023).Samsung Newsroom (2022), "[Interview] Samsung Designers Explain How To Play and Connect With a Brand on Roblox", available at: https://news.samsung.com/global/interview-samsung-designers-explain-how-to-play-and-connect-with-a-brand-on-roblox?utm_source=rss&utm_medium=direct (accessed 29 March 2023).

[94] Cryptopotato (2022), "Samsung And Nifty Gateway Launch The World's First Smart Tvs Compatible With NFT", available at: https://cryptopotato.com/samsung-and-nifty-gateway-launch-the-worlds-first-smart-tvs-compatible-with-nft/ (accessed 29 March 2023).

[95] Petapixel (2022), "Samsung Explains How It Will Integrate Photo NFTs into its 2022 TVs", available at: https://petapixel.com/2022/04/01/samsung-explains-how-it-will-integrate-photo-nfts-into-its-2022-tvs/ (accessed 29 March 2023).

[96] Breadnews (2022), "Samsung Unveils 3 TVs With NFT Management Capability In 2022 Lineup", available at: https://breadnews.com/2022/01/04/samsung-unveils-3-tvs-with-nft-management-capability-in-2022-lineup/ (accessed 29 March 2023).

[97] Beincrypto (2022), "Samsung Galaxy devices support blockchain hardware wallets", available at: https://beincrypto.com/samsung-galaxy-devices-support-blockchain-hardware-wallets/ (accessed 29 March 2023).

4.4. Hyundai

Hyundai is one of the leading smart mobility solution providers, producing vehicles by leveraging artificial intelligence, robotics, and autonomous driving technologies.[98] Recently, the company expressed strategic interest towards the metaverse, as emphasizes by the Group's 2022 New Year address, held on the metaverse,[99] as well as by the announcement for the construction of a Meta-Factory (i. e., a digital-twin of a real-world factory supported by a metaverse platform) .[100]

4.4.1. Metaverse BM description

Hyundai's digital BMI toward the metaverse is marked by virtual interactions driven by two main kinds of products. These are the company's traditional physical products, i.e., products that traditionally drive Hyundai's IRL business, and new totally digital products, i.e., products that Hyundai set for extending both real world and virtual world revenues.

As for the first point, i.e., new virtual interaction around the company's traditional physical products, Hyundai defined a virtual space on Roblox (i.e., Hyundai Mobility Adventure), expanded a virtual copy of an IRL brand experience space on Zepeto (i.e., Hyundai Motorstudio), and settle metaverse-based showrooms, immersive experiences, and exclusive limited events both on proprietary website and partners' metaverse platforms. In such virtual environments, the brand promoted games and social activities as well as showcased its most advanced products. As a result, Hyundai assured users to test products in the form of customized avatars[101] or feature in-real-time connections with employees.[102] Moreover, the vehicle producer promoted advancements between different technologies, with the aim of incorporating the metaverse technology with extant technologies. Specifically, the company empowered existing physical product, i.e., robots, digital twin, smart devices (i.e., enhanced mobilities such as advanced cars) with the aim of

[98] Hyundai Motor Group Tech (2020), "Reasons Hyundai Seeks To Boost Innovation Through", available at: https://tech.hyundaimotorgroup.com/article/reasons-hyundai-seeks-to-boost-innovation-through/ (accessed 29 March 2023).

[99] Hyundai (2022), "Hyundai Motor Group Executive Chair Outlines Direction for 2022 in Metaverse New Year Address", available at: https://www.hyundai.com/worldwide/en/company/newsroom/hyundai-motor-group-executive-chair-outlines-direction-for-2022-in-metaverse-new-year-address-0000016774?minDate=00000000000&selectedVal=&year=0&searchKey=metaverse&type=RES&type=IMG&tags=metaverse%20metaverse&selection=&pageNo=1&maxDate=20220810225216&rowCount=15&latest=true&listPageUrl=release.all (accessed 29 March 2023).

[100] Hyundai (2022), "Robotics in the real world and metaverse: A Hyundai vision", available at: https://www.hyundai.com/worldwide/en/company/newsroom/hyundai-motor-and-unity-partner-to-build-meta-factory-accelerating-intelligent-manufacturing-innovation-0000016780?minDate=00000000000&selectedVal=&year=0&searchKey=metaverse&type=RES&type=IMG&tags=metaverse%20metaverse&selection=&pageNo=1&maxDate=20220810225216&rowCount=15&latest=true&listPageUrl=release.all (accessed 29 March 2023).Pulsenews (2022), "Hyundai Motor teams up with Unity on metaverse factory to innovate productivity", available at: https://m.pulsenews.co.kr/view.php?year=2022&no=20281 (accessed 29 March 2023).Engineering (2022), "Hyundai and Unity Team Up to Bring a Car Factory into the Metaverse", available at: https://www.engineering.com/story/hyundai-and-unity-team-up-to-bring-a-car-factory-into-the-metaverse (accessed 29 March 2023).

[101] Irishtechnews (2022), "5 brands creating outstanding customer experience in the metaverse", available at: https://irishtechnews.ie/5brands-outstanding-customer-experience-metaverse/ (accessed 29 March 2023).Hyundai (2021), "Hyundai Motor Vitalizes Future Mobility in Roblox Metaverse Space, Hyundai Mobility Adventure", available at: https://www.hyundai.com/worldwide/en/company/newsroom/hyundai-motor-vitalizes-future-mobility-in-roblox-metaverse-space%252C-hyundai-mobility-adventure-0000016713 (accessed 29 March 2023).YouTube (2022), "Test Drive Hyundai IONIQ 6 | Hyundai Mobility Adventure | Roblox", available at: https://www.youtube.com/watch?v=wMnbN2bCl0Y (accessed 29 March 2023).Hyundai (2022), "Hyundai Motor to Expand Virtual Hyundai Motorstudio on ZEPETO Metaverse Platform", available at: https://www.hyundai.com/worldwide/en/company/newsroom/hyundai-motor-to-expand-virtual-hyundai-motorstudio-on-zepeto-metaverse-platform-0000016840?minDate=00000000000&selectedVal=&year=0&searchKey=metaverse&type=RES&type=IMG&tags=metaverse%20metaverse&selection=&pageNo=1&maxDate=20220810225216&rowCount=15&latest=true&listPageUrl=release.all (accessed 29 March 2023).Marketing Interactive (2021), "Hyundai Motor rides metaverse wave with adventure on Roblox", available at: https://www.marketing-interactive.com/hyundai-motor-rides-metaverse-wave-with-roblox-adventure (accessed 29 March 2023).

[102] Hyundai Wia (2021), "HYUNDAI WIA launches 'digital platform' using virtual reality technology", available at: http://en.hyundai-wia.com/investment/news_view.asp?keyIdx=4217&keyField=&keyWord=&gubun=EN&flag=NEWS&keyCate=&page=1 (accessed 29 March 2023).Carbuzz (2021), "Hyundai Wants To Do Business In The Metaverse", available at: https://carbuzz.com/news/hyundai-wants-to-do-business-in-the-metaverse (accessed 29 March 2023).Hyundai Newsroom (2022), "Hyundai IONIQ 6 Electrified Streamliner Debuts with Extended Range and Innovative Personal Space", available at: https://www.hyundai.news/eu/articles/press-releases/hyundai-ioniq-6-electrified-streamliner-debuts.html (accessed 29 March 2023).Hyundai (2020), "Hyundai and SM Entertainment Present 'The All-New Tucson, Beyond DRIVE' Innovative Virtual Showcase for Hot New SUV", available at: https://www.hyundai.com/worldwide/en/company/newsroom/hyundai-and-sm-entertainment-present-%E2%80%98the-all-new-tucson%2C-beyond-drive%E2%80%99-innovative-virtual-showcase-for-hot-new-suv-0000016561?minDate=20100000000000&selectedVal=&selection=&pageNo=1&maxDate=20220811001744&searchKey=virtual&rowCount=15&type=RES&type=IMG&tags=virtual%20virtual&listPageUrl=releases.all (accessed 29 March 2023).Playtoearn (2022), "Hyundai New Creta Model Set for Decentraland Debut", available at: https://playtoearn.net/news/hyundais-new-creta-model-set-for-decentraland-debut (accessed 29 March 2023).Iot Automotive (2022), "Hyundai Mobis demonstrates future vehicle concepts and metaverse practicality at CES", available at: https://iot-automotive.news/hyundai-mobis-demonstrates-future-vehicle-concepts-and-metaverse-practicality-at-ces/ (accessed 29 March 2023).

Table 2
Cross-case comparison.

|	NIKE	GUCCI	SAMSUNG	HYUNDAI
METAVERSE BM DESCRIPTION	Offering of virtual and digital products within virtual world: Launch of virtual world experience on online videogame platform Release of NFT collections	Offering of virtual and digital products, establishment of virtual world and experiences, and reinforcement of physical channel: Development of virtual world experiences on online videogame and social platforms Release of NFT collections	Connection of virtual and physical interaction modalities: Launch of virtual world experiences on online videogame platforms Release of NFT collections Update of TV and smartphone products with metaverse-related technologies	Offering of digital products within virtual world and experience and connection of virtual and physical interaction modalities: Launch of a virtual world and virtual experiences on online platforms and proprietary website Release of NFT collections as a base for NFT community
VALUE CREATION MECHANISMS	Use of virtual platform as testing ground for better offering Influence of physical business: omnichannel strategy Customization and co-creation of value	Active interactions among users and with the brand through co-creation of value and affirmation of virtual identities Influence of physical business: combination of physical and virtual offerings Customization and co-creation of value	Use of virtual platform as testing ground for better offering Active interactions among users and with the brand through co-creation and affirmation of virtual identities Influence of physical business: new consumer-product interaction modality; combination of physical and virtual offerings Customization and co-creation of value	Use of virtual platform as testing ground for better offering Influence of physical business: new consumer-product interaction modality
VALUE CAPTURE MECHANISMS	Enlargement of customer segment Direct-to-avatar revenue model Brand awareness, engagement, and loyalty	Enlargement of customer segment Direct-to-avatar revenue model Brand awareness, engagement, and loyalty Different pricing strategy Growth of familiarity and adoption of emerging metaverse technology	Enlargement of customer segment Direct-to-avatar revenue model Brand awareness, engagement, and loyalty Growth of familiarity and adoption of emerging metaverse technology	Enlargement of customer segment Brand awareness, engagement, and loyalty
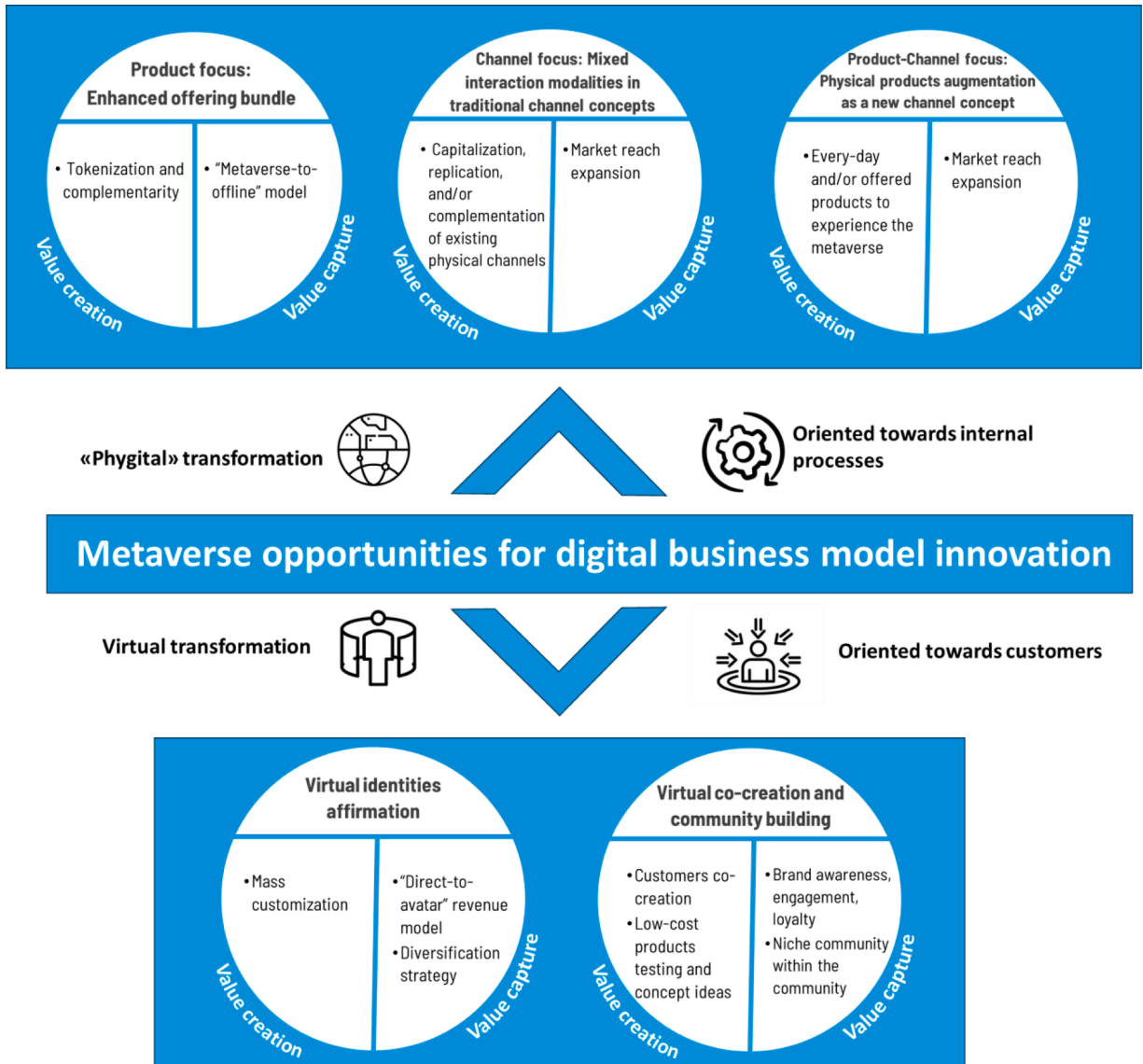
Fig. 1. Systematization of value creation and capture mechanisms arising from metaverse opportunities.

connecting them to metaverse platforms. In this way, existing physical products features can be augmented.[103]

As for the second point, i.e., new virtual interaction around totally new digital products, Hyundai shaped an NFT community consisting of official NFT website, Discord, and Twitter profiles, as well a membership program centered around the release of limited edition NFTs.[104] In this way, the company provided users with a unique and better personalized brand experience leveraging NFTs to experience Hyundai's NFT-based metaverse (i.e., Metamobility universe) .[105]

4.4.2. Value creation mechanisms

Two new value creation mechanisms characterized Hyundai's digital BM in the metaverse.

First, tech advancement and interoperability would transform physical products into connectors between the physical world and the virtual world in the near future. This is possible, for example, by transforming cars into entertainment spaces, meeting rooms, or 3D video game spaces.[106]

Second, the involvement of customers in open beta service on metaverse platforms allowed the company to create value with external ideas.[107] Indeed, in this way, Hyundai was able to test new virtual experiences, thus releasing better offering.

4.4.3. Value capture mechanisms

Hyundai's metaverse BM features an important value capture mechanism. Specifically, the virtual world experiences and NFT community allowed to establish strong and long-lasting relationships[108] with new customers, i.e., young technologically savvy customers familiar with such platforms, vehicles' lovers, and NFTs fans.[109] In this way Hyundai secured "competitiveness in the global sales market", as an unnamed Hyundai official reported.[110] In fact, with virtual experiences, Hyundai promoted young users' interactions with its emerging products before they were available for in-person viewing. Accordingly, the company was able to translate an enhanced connection in virtual worlds into a subsequent physical purchase.[111] Moreover, with the NFT community, the

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[103] Design products & applications (2022), "Robotics in the real world and metaverse: A Hyundai vision", available at: https://www.dpaonthenet.net/article/188742/Robotics-in-the-real-world-and-metaverse–A-Hyundai-vision.aspx (accessed 29 March 2023).TechCrunch (2022), "Hyundai sends Boston Dynamics' Spot robot into the metaverse", available at: https://techcrunch.com/2022/01/04/hyundai-plans-to-incorporate-robots-into-the-metaverse-to-help-users-reach-out-and-touch-someone/ (accessed 29 March 2023).YouTube (2022), "Hyundai's vision for the future explained in 8 minutes (with Metaverse, Boston Dynamics)" available at: https://www.youtube.com/watch?v=X0aiG75Y_vM (accessed 29 March 2023).

[104] Forkast (2022), "Hyundai Motor drives into metaverse branding with Meta Kongz NFT project", available at: https://forkast.news/headlines/hyundai-metaverse-branding-meta-kongz-nft/ (accessed 29 March 2023).

[105] Analyticsindiamag (2022), "The real reason automakers are investing in NFTs", available at: https://analyticsindiamag.com/the-real-reason-automakers-are-investing-in-nfts/ (accessed 29 March 2023).Hyundai (2022), "Hyundai Motor Issues First Community-Based NFT among the Automakers, Highlighting Its Mobility Solutions in the Metaverse", available at: https://www.hyundai.com/worldwide/en/company/newsroom/hyundai-motor-issues-first-community-based-nft-among-the-automakers%2C-highlighting-its-mobility-solutions-in-the-metaverse-0000016817?minDate=00000000000&selectedVal=&year=0&searchKey=metaverse&type=RES&type=IMG&tags=metaverse%20metaverse&selection=&pageNo=1&maxDate=20220810225216&rowCount=15&latest=true&listPageUrl=release.all (accessed 29 March 2023).

[106] Motortrends (2022), "Hyundai's Metaverse Merges the Real And Digital Worlds in One", available at: https://www.motortrend.com/events/hyundai-metaverse-merges-real-digital-worlds-one-robotics/ (accessed 29 March 2023).

[107] Hyundai (2021), "Hyundai Motor Vitalizes Future Mobility in Roblox Metaverse Space, Hyundai Mobility Adventure", available at: https://www.hyundai.com/worldwide/en/company/newsroom/hyundai-motor-vitalizes-future-mobility-in-roblox-metaverse-space%252C-hyundai-mobility-adventure-0000016713 (accessed 29 March 2023).

[108] Hyundai (2022), "Hyundai Motor to Expand Virtual Hyundai Motorstudio on ZEPETO Metaverse Platform", available at: https://www.hyundai.com/worldwide/en/company/newsroom/hyundai-motor-to-expand-virtual-hyundai-motorstudio-on-zepeto-metaverse-platform-0000016840?minDate=00000000000&selectedVal=&year=0&searchKey=metaverse&type=RES&type=IMG&tags=metaverse%20metaverse&selection=&pageNo=1&maxDate=20220810225216&rowCount=15&latest=true&listPageUrl=release.all (accessed 29 March 2023).

[109] Nft Cable (2022), "Hyundai Is Back With Its Second NFT Collection", available at: https://nftcable.io/news/hyundai-is-back-with-its-second-nft-collection/ (accessed 29 March 2023).

[110] Hyundai Wia (2021), "HYUNDAI WIA launches 'digital platform' using virtual reality technology", available at: http://en.hyundai-wia.com/investment/news_view.asp?keyIdx=4217&keyField=&keyWord=&gubun=EN&flag=NEWS&keyCate=&page=1 (accessed 29 March 2023).

[111] The Harris Poll (2022), "Hyundai Captures Gen Z's Interest Through the Metaverse", available at: https://theharrispoll.com/briefs/hyundai-captures-gen-zs-interest-through-the-metaverse/ (accessed 29 March 2023).

manufacturer focused on storytelling, as indicated by Thomas Schemera, Global Chief Marketing Officer at Hyundai Motor.[112] Specifically, storytelling allowed for increasing continuative interaction between the brand and the customers around NFTs usage in the virtual world. In this way, the company innovated value capture through enhanced brand awareness, engagement and, finally, loyalty in the metaverse.[113] In fact, NFTs were initially available with pre-sale and general sale on Hyundai NFT website to users actively engaged in the community, and subsequently on secondary market platforms (e.g., Opensea), thus generating new revenue streams. Moreover, NFTs provided holders with different benefits (e.g., airdrop,[114] virtual giveaway, exclusive VIP access in Hyundai's virtual world, exchange of NFTs with a gift card for a physical custom NFT object) communicated via community channel (i.e., Discord). This resulted in increased brand loyalty based on community and rewards mechanisms, potentially turning into augmented revenue streams.[115]

4.5. Cross-case comparison

After conducting within-case analysis we proceeded with cross-case comparison (Eisenhardt, 1989), with the support of Table 2.

5. Discussion

In this section the discussion of our findings is presented. To this aim, we realized a descriptive model illustrated in Fig. 1. The model systematizes the new value creation and capture mechanisms in virtual worlds arising from specific metaverse opportunities. In particular, the metaverse opportunities releasing the new value mechanisms have been clustered around the two main concepts traditionally defining BMs (Frank et al., 2019), i.e., the internal processes and the customers. As evident from Fig. 1, metaverse opportunities oriented towards internal processes (i.e., "Product focus: Enhanced offering bundle", "Channel focus: Mixed interaction modalities in traditional channel concepts", "Product-Channel focus: Physical products augmentation as a new channel concept") act on products and channels features with the aim of innovating value mechanisms through the so-called "phygital" transformation, i.e., union of physical and digital worlds' realities (Tolstikova et al., 2020). Instead, metaverse opportunities oriented towards customers (i. e., "Virtual identities affirmation", "Virtual co-creation of value and community building") trigger innovations in value mechanisms by allowing customers' immersion in totally digital and virtual worlds.

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[112] Hyundai (2022), "Let's Get 'Phygital': Hyundai Motor Adapts IONIQ 6's Electrified Experience to Digital Space with NFT Collection", available at: https://www.hyundai.com/worldwide/en/company/newsroom/let%E2%80%99s-get-%E2%80%98phygital%E2%80%99-hyundai-motor-adapts-ioniq-6%E2%80%99s-electrified-experience-to-digital-space-with-nft-collection-0000016861?minDate=00000000000&selected Val=&year=0&searchKey=&type=RES&type=IMG&selection=&pageNo=1&maxDate=20220810225004&rowCount=15&latest= true&listPageUrl=release.all (accessed 29 March 2023).

[113] Kedglobal (2022), "Hyundai Motor enters metaverse sphere in tie-up with Meta Kongz", available at: https://www.kedglobal.com/metaverse/ newsView/ked202204190006 (accessed 29 March 2023).Hyundai (2022), "Let's Get 'Phygital': Hyundai Motor Adapts IONIQ 6's Electrified Experience to Digital Space with NFT Collection", available at: https://www.hyundai.com/worldwide/en/company/newsroom/let%E2%80%99s-get-%E2%80%98phygital%E2%80%99-hyundai-motor-adapts-ioniq-6%E2%80%99s-electrified-experience-to-digital-space-with-nft-collection-0000016861?minDate=00000000000&selectedVal=&year=0&searchKey=&type=RES&type=IMG&selection=&pageNo=1&maxDate= 20220810225004&rowCount=15&latest=true&listPageUrl=release.all (accessed 29 March 2023)

[114] The airdrop is the distribution of NFTs to virtual wallet addresses meeting certain criteria, usually performed to dispense free NFTs to users who have been selected through specific events.

[115] Hyundai (2022), "Hyundai Metamobility universe: Hyundai releases new NFTs that open up a world of new mobility", available at: https:// www.hyundai.com/worldwide/en/brand/hyundai-metamobility-universe (accessed 29 March 2023).Hyundai (2022), "Hyundai Motor Launches First Exclusive Metamobility NFT Collection, 'Shooting Star'", available at: https://www.hyundai.com/worldwide/en/company/newsroom/ worldwide/en/company/newsroom/worldwide/en/company/newsroom/worldwide/en/company/newsroom/hyundai-motor-launches-first-exclusive-metamobility-nft-collection,-%E2%80%98shooting-star%E2%80%99-0000016827 (accessed 29 March 2023).Hyundai (2022), "Nft", available at: https://www.hyundai-nft.com/ (accessed 29 March 2023).Cryptofiles (2022), "Hyundai's "Shooting Star" NFTs Are Turning Into "MobED (Mobile Eccentric Droid)" NFTs", available at: https://blog.cryptoflies.com/hyundais-shooting-star-nfts-are-turning-into-mobed-mobile-eccentric-droid-nfts/ (accessed 29 March 2023).Hyundai (2022), "Hyundai Metamobility 2nd Collection", available at: https://www.hyundai-nft. com/2nd-collection (accessed 29 March 2023).Hyundai (2022), "Let's Get 'Phygital': Hyundai Motor Adapts IONIQ 6's Electrified Experience to Digital Space with NFT Collection", available at: https://www.hyundai.com/worldwide/en/company/newsroom/let%E2%80 %99s-get-%E2%80%98phygital%E2%80%99-hyundai-motor-adapts-ioniq-6%E2%80%99s-electrified-experience-to-digital-space-with-nft-collection-0000016861?minDate=00000000000&selectedVal=&year=0&searchKey=&type=RES&type=IMG&selection=&pageNo=1 &maxDate=20220810225004&rowCount=15&latest=true&listPageUrl=release.all (accessed 29 March 2023)

5.1. Metaverse opportunities oriented towards internal processes

5.1.1. Product focus: Enhanced offering bundle

Metaverse opportunity connected with enhanced product bundle refers to the creation of a mixed offering containing both physical and digital products and providing increased benefits in virtual and/or physical worlds. This metaverse opportunity is in line with digital BMI literature asserting that digital technologies allow to revise and/or extend offering configurations (Parida et al., 2019; Rachinger et al., 2019). As a result, a new bundle of multiple products can be released with low efforts (Kurtz, 2021) and high profitability, since the multiple products composing the bundle provide more value and more revenues than the ones released by the separate products (Amit & Zott, 2001).

5.2. Value creation mechanisms arising from the metaverse opportunity

As regards the impact of this metaverse opportunity on value creation mechanisms, exemplar is the release of digital product accompanied by IRL corresponding version experienced in Gucci's case, as well as the completion of IRL physical offering with digital accompaniment product performed by Samsung. These findings advance the extant studies that consider metaverse virtual offerings creating value regardless of physical products (Elmasry et al., 2022). In fact, we note that in the metaverse the value can be created within a new product offering (Kshetri, 2022) bridging digital and physical merchandise (Moy et al., 2022; Moro Visconti, 2022) in two ways. First, there is tokenization, i.e., virtual replication of physical offering in the virtual world (Gupta, 2022; Ghose et al., 2022), leveraged by Gucci. Second, there is complementarity, i.e., introduction of additional digital product in addition to the focal physical product (Amit & Zott, 2001; Bosler et al., 2021; Ciasullo & Lim, 2022), evident in Samsung's case.

5.3. Value capture mechanisms arising from the metaverse opportunity

As regards the impact of this metaverse opportunity on value capture mechanisms, exemplar is the possibility for digital products purchases to be redeemed for IRL goods, pointed out by Hyundai and Nike cases. These findings introduce a new mechanism for increasing revenues by means of a connection between physical and virtual offerings. This is the so-called "metaverse-to-offline" model, where engagement (turning into future sales) and/or actual sales in physical products are driven and/or enhanced by virtual items provision (Elmasry et al., 2022; Ghose et al., 2022).

5.3.1. Channel focus: mixed interaction modalities in traditional channel concepts

Metaverse opportunity connected with mixed interaction modalities regards the extension of physical and/or traditional digital channels with totally virtual ones, thus releasing omnichannel benefits. The previous literature studied the potentialities of digital technologies and "phygital" tools to enhance interaction with customers due to a more dynamic, fast, and low-cost global approach (Rachinger et al., 2019; Li, 2020; Klos et al., 2021). This phenomenon assumes infinite possibilities in the metaverse, where superior chances for innovating interactions, relationships, and engagement with customers are released (Abovitz et al., 2022; Elmasry et al., 2022; Kshetri, 2022).

5.4. Value creation mechanisms arising from the metaverse opportunity

The creation of value upon this metaverse opportunity can happen in two main ways, the first one is based on capitalization of already existing traditional physical channels, and the second one can rely on the replication and/or complementation of traditional physical channels.

In Nike case, a physical store (i.e., an already existing traditional physical channel) was empowered with different metaverse-related technologies (e.g., onsite cameras) to blur physical and virtual experiences. This results in a new form of experience based on interactions mixed between the physical and virtual worlds. In fact, the enhancement of traditional physical channels (i.e., stores) with metaverse technologies allowed the company to benefit from an omnichannel strategy.

Instead, in Gucci, Samsung, and Hyundai cases, virtual experiences replicated and/or complemented experiences within IRL stores and events. As a result, a more intuitive and direct interaction process was achieved, connecting with consumers anytime and any-where, both online and offline (Bourlakis et al., 2009; Ghose et al., 2022). This allowed for simplified brand connection (as evident in Gucci's case), in-advance uncovering of IRL offering (as evident in Samsung's case), and product customization through immersive digital testing of features addable to physical products (as evident in Hyundai's case).

5.5. Value capture mechanisms arising from the metaverse opportunity

The capture of value by means of this metaverse opportunity regards the expansion of the market that the company can realistically address. Indeed, the integration of physical and virtual channels performed by Gucci through the acceptance of cryptocurrency payments in physical stores expanded the market that the company can realistically address (Pazos, 2018). Specifically, on the one hand, the company provided a new distribution channel appreciated and employed by new customers profiles (i.e., tech-savvy users and crypto-investors). On the other hand, the company promoted user familiarity and mass adoption of a metaverse-related technology (Kraus et al., 2022), thus increasing the new channel adoption by the market.

5.5.1. Product-Channel focus: Physical products augmentation as a new channel concept

Metaverse opportunity connected with physical products augmentation concerns with new features assumable by not metaverse-native physical products for interaction and experience of virtual worlds. This allows companies to perform digital BMI towards the metaverse not only by transporting or extending physical activities to a virtual world (as emerged from value creation and capture mechanisms observed in the previous section), but also by transforming the physical world (Gupta, 2022).

5.6. Value creation mechanisms arising from the metaverse opportunity

This opportunity innovates value creation mechanisms by augmenting the function of products traditionally used in customers' everyday IRL to interact with the companies (e.g., smartphones in Nike case) and/or products traditionally representing the offering of the companies (e.g., smartphones in Samsung case, cars in Hyundai case). Digital BMI literature assessed the impact of digital technologies on products, in terms of enhancement of physical products with novel digital functions (Bican et al., 2020; Vaska et al., 2021) to innovate value creation mechanisms (Bosler et al., 2021) through servitization logics (Parida et al., 2019; Frank et al., 2019). Although digital BMI towards the metaverse, as digital BMI paths, leads to modifications in existing physical products' features changing the way customers use them (D'Ippolito et al., 2019), the main focus overtakes servitization towards an enhanced step, i.e., experience (Bourlakis et al., 2009; Wang et al., 2021; Stackpole, 2022). In fact, our findings reveal that these products can be leveraged to enhance virtual life experiences, thus connecting physical and virtual worlds (Wang et al., 2021), as happened in Nike, Samsung, and Hyundai cases with smartphones and cars products. Therefore, we advance current metaverse studies by emphasizing that specific devices (e.g., human-machine interfaces) are necessary to connect the physical and virtual worlds (Abovitz et al., 2022; Lin, 2022). In particular, we reveal that common every-day life products can cover this connectivity role. Hence, we argue that generativity, i.e., combination and integration of existing inputs to release new forms of incremental combinatorial innovation (Ciriello et al., 2018; Thomas & Tee, 2022), drives digital BMI in the metaverse by allowing products to become experience channels. In fact, this is what happened, for example, through the combination of smartphones' accelerometers in metaverse platforms to transform IRL movement in online movement. In this way, we support theses according to which digital BMI towards the metaverse can be handled also through incremental forms of innovation acting on existing assets rather than exclusively radical innovations for the development of disruptive BMs' components (Kraus et al., 2022).

5.7. Value capture mechanisms arising from the metaverse opportunity

The innovation in value capture through this metaverse opportunity consists in the following. New metaverse-related features can be added to IRL products offered by the company, as Samsung's case pointed out. In fact, the company integrated NFT platforms on its traditional physical TV offering as well as added digital wallets on its traditional smartphones offering. In both cases, the addition of metaverse-related features to IRL products was performed to sustain crypto transactions. Therefore, a new revenue channel released new value capture mechanisms. This revenue channel leveraged the augmentation of physical assets and allowed for purchases in virtual worlds. First, it allowed for omnichannel commerce, since it was aimed at embedding payment functionalities within smart devices (Elmasry et al., 2022). Second, it promoted usage of every-day technologies within the metaverse (Kraus et al., 2022), thus allowing both digital skilled and non-digital skilled users to become familiar with the metaverse. This is an important passage, given that most digital BMs relying on advanced and metaverse technologies failed to diffuse due to challenges in product/service usability and spread of technology in the social system (Tumasjan & Beutel, 2019).

5.8. Metaverse opportunities oriented towards customers

5.8.1. Virtual identities affirmation

Metaverse opportunity connected with virtual identities affirmation relies upon the possibility for clients to build their own identity in virtual worlds. In fact, avatars and digital objects allow virtual world visitors to establish their virtual identities and model them based on their own personality and self-expression (Ghose et al., 2022; Kshetri, 2022; Stackpole, 2022).

5.9. Value creation mechanisms arising from the metaverse opportunity

In reference to value creation mechanisms, an innovation is provided by this metaverse opportunity. As evident form Nike and Gucci cases, by providing personal spaces and personalization options for virtual products and digital contents, customers' expression is fueled, resulting in a deep connection between the new virtual identity and the brand. This is possible by means of mass customization, i.e., the provision of personalized products and/or experiences by means of modular and standard components (Helms et al., 2008). In fact, as evident from all the cases, virtual items and digital assets (Joy et al., 2022) allowed to create value through extreme customization and satisfaction of self-actualization needs with one-of-a-kind items provision (Amit & Zott, 2001; Klos et al., 2021; Lin, 2022).

5.10. Value capture mechanisms arising from the metaverse opportunity

Which respect to value capture mechanisms released by this metaverse opportunity, the company's virtual offering for the construction of virtual identities resulted in a new direct-to-avatar revenue model and a new diversification strategy.

The direct-to-avatar revenue model consists in the sale of virtual products available in virtual worlds for virtual world customer identities, i.e., avatars (Holness, 2021; Joy et al., 2022). Although scholars recognized that new revenue models can arise from digital BMI (Parida et al., 2019), the direct-to-avatar revenue model is unique of digital BMI paths towards the metaverse. In fact, this revenue model leverages metaverse-related technologies (e.g., NFTs) enabling at the same time monetization and customer engagement, often through precise mimic of IRL items (Abovitz et al., 2022; Kraus et al., 2022; Kshetri, 2022). Our findings reveal that the direct-to-avatar revenue model can be represented as a virtual-world revision of the physical direct-to-customer revenue model (Biller et al., 2005; Janssen et al., 2008), enhanced through two peculiarities. First, there is the social commerce mechanisms (Cheng et al., 2019), i.e., integration of social-media entertainment aspects within commercial transactions (Elmasry et al., 2022). This is what happened in Nike's case, allowing Nike-wearing virtual avatars to move to other virtual environments in Roblox, thus transforming visitors into digital brand ambassadors across multiple virtual worlds. Second, there are gamification techniques, i.e., integration of shopping experiences into metaverse virtual games through in-game currencies (Kshetri, 2022). This is what happened in Gucci and Samsung cases, where in-game currencies allowed the purchase of specific virtual products. As a result of these two peculiarities, the direct-to-avatar revenue model creates a close connection and multiple transactions between the brand and the customers regardless of the physical distance (Janssen et al., 2008; Elmasry et al., 2022).

Alongside the direct-to-avatar revenue model, there is another important value capture mechanism released by the virtual identities' affirmation opportunity, i.e., the release of a new diversification strategy. This can be defined as the company's adoption of different (i.e., at least two) BMs, each of which is associated with a distinct monetization mechanism (e.g., pricing strategy) and/or a different customer segment (Aversa and Haefliger, 2017; Benghozi, 2020). In our findings, we retrieve a new diversification strategy in Gucci's case thanks to the offering of digital goods to affirm virtual identities. In fact, Gucci adopted new pricing strategies for its BMs focused on digital goods. Such pricing strategies are different from the traditional pricing strategies that Gucci adopted for its BMs focused on physical goods. With this result, we corroborate with empirical results the scant literature stream assessing the existence of BM diversification as a distinct and complementary type of diversification with respect to traditional corporate diversification strategies (Aversa and Haefliger, 2017).

5.10.1. Virtual co-creation of value and community building

Metaverse opportunity connected with virtual co-creation of value and community building relies upon the increase of customers' participation. Such participation shape both customers-customers and brand-customers interactions in virtual worlds. In fact, digital BMI towards the metaverse inherently and natively focuses on community building and co-creation of value due to the interactive nature of the metaverse technology (Holness, 2021; Kshetri, 2022; Lin, 2022).

5.11. Value creation mechanisms arising from the metaverse opportunity

This metaverse opportunity releases innovations in value creation mechanisms observable in all the four cases. In particular, we observed high involvement of customers into value creation by means of co-creation logics (Mir & Hassan, 2018; Klos et al., 2021; Kshetri, 2022; Moro Visconti, 2022) aimed at enriching metaverse experiences. In fact, the four companies in the metaverse establish better and simpler interfaces, turning passive audiences into active participants. Specifically, value co-creation was facilitated with both other members (e.g., in the form of participation in generative art project as in Samsung case) and the firms (e.g., in the form of design, customization, showcase of self-produced items as in Nike, Gucci, and Samsung cases) (Gregori & Holzmann, 2020; Klos et al., 2021; Accenture, 2022). Therefore, our findings reveal that digital BMI toward the metaverse amplifies personal agency (Accenture, 2022) within value co-creation logics. In addition to this, we also spot another value mechanism connected with better understanding of customers' desires and needs (Parida et al., 2019) due to their active participation and involvement in the co-creation of value. In particular, new products and concept ideas can be released. In fact, virtual experiences can be used as a simulation of reality. This allows to evaluate the fit of new products ideas or features for the IRL market (as in Nike's case) and/or to control users' data and information in the metaverse for better offering (as in Samsung and Hyundai cases).

5.12. Value capture mechanisms arising from the metaverse opportunity

With reference to the innovation in value capture mechanisms as a result of this metaverse opportunity, increased streams of revenues derived from community building (Amit & Zott, 2001; Mir & Hassan, 2018; Abovitz et al., 2022; Kshetri, 2022) as the cases' analysis revealed. In fact, in all the four cases better virtual connections with customers were released by communities both on metaverse-related platforms (e.g., Roblox, Zepeto, Discord) and traditional social networks (e.g., Twitter, Instagram) (Gregori & Holzmann, 2020). In these communities, users can meet, express themselves, and co-create value around recreational areas, brand experiences, and mini-games (observed in all the metaverse-related platforms of our cases), as well as access and share contents and digital social events (observed in all the traditional social networks platforms of our cases). In particular, all the companies' communities relied on storytelling, emotional involvement (as Hyundai's case emphasized) and rewards for highly engaged members (as Gucci, Samsung, and Hyundai cases pointed out). In this way, the companies augmented brand awareness, engagement, and loyalty (Holness, 2021; Ciasullo & Lim, 2022; Kshetri, 2022). This translates in long-term relationships between the customers and the brands. Such relationships can potentially turn into increased revenue streams as they increase switching costs (Bourlakis et al., 2009; Mir & Hassan, 2018; Moro Visconti, 2022). In particular, this is especially true for the relationships established between the companies and the users around the rewards released by the companies. The rewards released by our cases were based on artificial scarcity, which stems from a limited supply of digital assets (i.e., NFTs) that customers want to own. As a result, the provision of rewards generated "a

more niche community-within-a-community for those who purchase" (Holness, 2021, p. 23), while resulting in higher monetary (e.g., royalties on secondary market trades) and non-monetary (e.g., decrease in retention costs) profits for the company (Amit & Zott, 2001; Klos et al., 2021; Elmasry et al., 2022).

6. Conclusion

The present paper explores the cutting-edge topic of the metaverse which is intriguing from both an intellectual and a managerial standpoint (Wang et al., 2021; Accenture, 2022) due to its disruptive effect on whole economies (Iqbal & Campbell, 2022). Specifically, we addressed this complex topic by looking at the innovation trajectories of BMs connected with the metaverse development. Therefore, based on the analysis of four cases performing digital BMI toward the metaverse (i.e., Nike, Gucci, Samsung, Hyundai), we systematized the new value creation and capture mechanisms in virtual worlds arising from specific metaverse opportunities. In particular, we spot five main metaverse opportunities affecting the two main elements characterizing firms' business models, i.e., the internal processes and the customers (Frank et al., 2019). Three metaverse opportunities are oriented towards internal processes. These opportunities regard products and channels features and innovate firms' value creation and capture mechanisms by means of the so-called "phygital" transformation. Two metaverse opportunities are oriented towards customers. These opportunities regard identities and communities and innovate firms' value creation and capture mechanisms by means of a virtual transformation. With this paper based on multiple sectors, we increase scientific knowledge and sustain managerial practice about digital BMI and the metaverse.

6.1. Theoretical implications

The paper contributes to both digital BMI literature, to the nascent metaverse literature, and to the information system literature.
First, our results allow to better understand how digital BMI can generate strategy revision to gain competitive advantage (D'Ippolito et al., 2019) by transforming BMs' value creation and capture mechanisms thanks to advanced technologies (Ciasullo & Lim, 2022). In particular, we focused on digital technologies shaping virtual and digital environments with high social and crowd involvement, whose comprehension was still scarce (Bourlakis et al., 2009; Hinings et al., 2018; Kraus et al., 2022). We contribute to this research stream on digital BMI by assessing the impacts of metaverse digital technologies on multiple value mechanisms (Elmasry et al., 2022).
Second, we recognized the potential of the metaverse to drive digital BMI through systematization of value creation and capture mechanisms deriving from five specific metaverse opportunities. In fact, the previous studies unveiled how general or specific individual digital technologies affected value creation and capture mechanisms to induce digital BMI (Parida et al., 2019; Vaska et al., 2021). However, no studies, to the best of our knowledge, approach how the metaverse creates and captures value, although this could be a valuable assessment. In fact, as the metaverse represents a combinatorial innovation of multiple advanced digital technologies without precedents (Gupta, 2022; Abovitz et al., 2022), it can trigger different opportunities for digital BMI which respect to the ones deriving from single and stand-alone technologies' application. We assessed these different opportunities and clustered them according to BMs theory (i.e., metaverse opportunities oriented towards internal processes, metaverse opportunities oriented towards customers). Finally, we unveil how these opportunities translate in value creation and capture. In this way, we adopted a simple approach to cope with the novelty of the topic (Xu et al., 2022; Madiega et al., 2022; Visconti, 2022), thus giving a BM perspective on emergent and still unrepresented literature of the metaverse (Bourlakis et al., 2009; Wang et al., 2021; Jung & Jeon, 2022).
Third, the current article contributes to the field of information system research (e.g., Wang et al., 2023), by exploring how information systems may support and promote digital BMI in the metaverse. This research, in particular, sheds new light on the technology infrastructure necessary for efficient value creation and capture in the metaverse. In most situations, such technical infrastructure is an accessible and ubiquitous infrastructure for end-users (i.e., PC), which is empowered and managed by third-party providers (as Roblox, The Sandbox, or Decentraland). Hence, this paper contributes to information system literature related to technological infrastructure (e.g., Wang et al., 2023) by stressing the importance of third-party accessible infrastructure. Furthermore, additional relevance for information system research comes from the investigation of the socio-technical dimensions of digital BMI in the metaverse. Indeed, authors explored how virtual connections and communities influence information system design and deployment, through the use of incentives (such as airdrops) to influence user behavior and collaboration in the metaverse.
With these three contributions, we enrich current digital BMI literature on innovation of value mechanisms with digital technologies (Parida et al., 2019; Vaska et al., 2021), thus helping in understanding how to promote innovation in complex industries, as the metaverse one (Klos et al., 2021).

6.2. Managerial implications

The paper serves as strategic counsel for the rising number of practitioners and incumbent organizations who see the metaverse as a lucrative potential for digital BMI (Accenture, 2022). In fact, because of difficulties in comprehending the most appropriate digital configuration of such BMs, the majority of organizations fail to profit from digital technology as well as metaverse potential (Bosler et al., 2021; Elmasry et al., 2022; Furlonger et al., 2022).
Therefore, we provide managers with a deep comprehension of both the metaverse phenomenon and digital entrepreneurial initiatives it releases. In this way, we support practitioners in comparing traditional physical BMs with new metaverse BMs, by clearly assessing which are the value mechanisms connected with two main metaverse opportunities that managers can seize to innovate their

BMs. Specifically, managers can operate specific actions pertained with "phygital" transformation of products, channels, and product+channels features to grasp the metaverse opportunities oriented towards internal processes. At the same time, companies can implement specific actions related to virtual transformation of customers' identities, co-creation logics, and communities to seize the metaverse opportunities oriented towards customers.

A particular reference is given to implications for information system managers, who are supported in design activities pertained with virtual scenarios. In such activities, we recommend information system managers to foster virtual communities, design intuitive user interfaces, and implement effective feedback mechanisms to enhance user satisfaction and loyalty. Moreover, another suggestion emerged from the paper lies in the definition of alliances with platforms or technological providers (as Roblox, The Sandbox, Decentraland) for integrating third-party services or exploring cross-platform integration opportunities.

With these considerations, managers can easily conduct a gap analysis and assess how their value mechanisms should evolve to operate in the metaverse. Specifically, companies can understand how to profit from the metaverse to perform digital BMI, by investing on specific value mechanisms oriented towards internal processes and customers. In fact, in this way, they can extend physical limits of real world businesses through both transformation of physical reality and construction of virtual reality (Elmasry et al., 2022; Gupta, 2022).

6.3. Limitations and future research avenues

The paper is affected by some limitations which can open the way towards new research avenues.

First, to augment knowledge on the phenomenon of the metaverse we adopted a multiple case study approach. Although this research approach is recognized as particularly suitable for shedding light on complex and emergent events as that of the metaverse, it features generalizability issues. We tried to stem the lack of generalizability typical of qualitative research methods by sampling cases in different industrial sectors and with multinational and global presence, so to reach an overall and deep vision of the phenomenon. However, we recognize that quantitative approaches can be highly useful to bring major consistency as well as theory testing. This could be particularly interesting, considering that we could not rely on primary data source (e.g., personal interviews), although we used much information from interviews and blog articles involving employees, managers, and partners from Gucci, Nike, Samsung, and Hyundai. Therefore, our theory building can represent a starting point to conduct new research with superior generalizability and theory refinement.

Second, to gain insightful and successful digital BMI towards the metaverse we concentrated on cases reflecting incumbents' strategies. The investigation of non-incumbents (e.g., startups) approaches towards the metaverse could be equally interesting. Moreover, we focused on non-metaverse native enterprises that began a digital BMI path towards metaverse. However, also digital incumbent companies operating in metaverse-related businesses (e.g., Meta, Microsoft, Apple) as well as digital native companies operating in metaverse businesses (e.g., Nifty Gateway) are innovating their BMs and/or building new BMs in the metaverse. Therefore, the assessment of such type of innovations can be taken in consideration to understand how companies can benefit from the metaverse as platform and solution providers rather than business adopters.

Third, to depict a detailed and updated picture of digital BMI towards the metaverse, we gather information from 2021, that is the date when the metaverse topic experienced many interests (Ghose et al., 2022; Accenture, 2022). However, the metaverse concept has been formulated for many years (Stephenson, 1992) and numerous digital entrepreneurial initiatives and companies have been founded upon it before 2021 (e.g., Second Life, The Sandbox, Decentraland, Roblox, Fortnite), some of which gained success and some of which failed. Therefore, it could be interesting to compare the digital BMI paths towards the metaverse undertaken in the past with the ones undertaken in the current days and/or to conduct longitudinal studies on the evolution of such companies' BMs. In this way, the transformation in the configuration of digital entrepreneurial activities as well as the external factors driving the rise of this phenomenon (e.g., technological, social, economic matters, pandemic influence on digital literacy and social change) can be assessed. As a result, the internal BMs perspective aimed at understanding value creation and capture mechanisms that we adopted can be reinforced with a complementary vision on external factors.

Fourth, to seize the maximum comprehension of a phenomenon highly based on social interaction and crowd involvement as the metaverse one (Bourlakis et al., 2009; Hinings et al., 2018; Kraus et al., 2022), we concentrated on companies operating in business-to-consumer settings. In fact, in this setting, the sense of immersion and real-time interactivity connected with the metaverse can be fruitfully applied to (i) define new customer experiences and omnichannel strategies, (ii) provide customized (i.e., tailored of surroundings) engagement content, (iii) build brand communities, and (iv) innovate products (Kim, 2021; Elmasry et al., 2022; Jung & Jeon, 2022). However, the metaverse allows to revise also business-to-business relationships (Kshetri, 2022; Jung & Jeon, 2022; Yang et al., 2022) and companies are engaging in its use towards optimization of business operations (e.g., Nvidia, Siemens). Therefore, scholars can assess the different approaches and digital BMI paths that companies can follow to operate in the metaverse by comparing findings in business-to-consumer and business-to-business settings.

Data availability

No data was used for the research described in the article.

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