Studies in Systems, Decision and Control 537

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Business Development via AI and Digitalization

Volume 2

Springer

Metaverse and NFT Market as AI Disruptive Technology for Digital Luxury Brands

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Abstract This study aims to develop a strictly view point applied of AI applied to luxury brands in digital platforms, as a strategic management tool, taking into account its emerging potential, advantages and benefits in the future, identifying the main features and factors underlined to digital platforms and tools that transform the new digital paradigm of the global luxury market, regarding its potential for sustainable luxury brands digital consumption. A exploratory qualitative methodology was applied, based on Systematic mapping study (SMS), both to analyse and to structure a broad research field concerning methods, designs and research. This methodological approach focused on scholarly papers published in renowned academic databases, namely Web of Science, Emerald, Wiley, Science Direct, Scopus, Taylor and Francis, and Sage (among others), as well Google Trends data, human-computer data through the video sensory stimuli, VR/AR, and industry and professional reports properly

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A. Hamdan and A. Harraf (eds.), *Business development via AI and Digitalization*,
Studies in Systems, Decision and Control 537,
https://doi.org/10.1007/978-3-031-62106-2_77

evaluated and selected. The development, application and use of AI in the context of digital luxury brands is still at an early stage, although it is already characterised as a new approach of exploring and achieving the ESG goals framework. In future, accumulated data and empirical research to reinforce the robustness of the outcomes derived of this study results is needed. This study advances a Metaverse and NFT as the newest tools of AI for digital luxury brands it will provide further guidance for its technology within the context of digital luxury brands.

Keywords IA · Disruptive technology · Metaverse · NFT · Digital luxury brands · Digital tools and platforms

1 Introduction

In the rapidly evolving digital era, the luxury brand industry is undergoing a significant transformation, predominantly influenced by the integration of Artificial Intelligence (AI) and digitalization. This shift represents both a challenge and an opportunity for luxury brands, as they navigate the complexities of adopting cutting-edge technologies while preserving their unique brand identities.

The integration of AI in the luxury brand industry is not merely a technological upgrade but a strategic evolution. Recent research indicates that AI applications in luxury brands have revolutionized consumer engagement and transformed traditional marketing strategies [14, 24]. However, this technological embrace comes with its own set of challenges, including maintaining brand exclusivity in the digital domain and addressing emerging concerns about consumer privacy and data security.

This study aims to investigate the strategic application of AI in the management of digital luxury brands. It focuses on how AI can be utilized to develop new profitable online revenue streams and enhance brand value and competitive advantage. Additionally, the research will explore the ethical implications and operational challenges of AI in the luxury sector. The significance of this study lies in its potential to provide comprehensive insights into the intersection of AI, luxury branding, and digital transformation, contributing to the strategic decision-making process in luxury brand management.

Structured methodically, this study will commence with an extensive literature review, followed by an in-depth analysis of key themes and topics. The conclusion will synthesize the findings, offering insights and directions for future research in the realm of AI and digital luxury branding.

2 Literature Review

2.1 Digital Luxury Brands

Luxury fashion brands have entered the tech world in various ways, with the aim of utilizing the digital world to their advantage, particularly the Metaverse and NFT digital marketplaces. One of the main advantages of online platforms is that they are not constrained by limited materials and labour, and there are no problems of overstocking or discounting to decrease brand value [3].

Although luxury brands generally have a very traditional and conservative approach, however, with the Covid-19 pandemic, these companies have been pressured to make strategic decisions towards the digital and technological world [13]. For this reason, more and more companies in the luxury market are changing their approach and mentality, incorporating the virtual world into their long-term strategies, while trying to reach new consumers who, if they followed the traditional way, would not be able to attract their attention, such as Generation Z [8]. By accelerating the adoption of strategies that include the digital world, providing luxury shopping experiences using technology, this new target audience can be captivated and respond positively to the onslaught of luxury brands [8].

2.2 Metaverse Principles and Applications

Dioniso et al. [9] argues that "the word Metaverse is a portmanteau of the prefix 'meta' (meaning 'beyond') and the suffix 'verse' (shorthand for 'universe')". It means that "a universe beyond the physical world refers to a computer generated world, distinguishing it from metaphysical or spiritual conceptions of domains beyond the physical realm" (pp. 6–7). Recently, according to Mystakidis [22], the Metaverse is a post-reality universe, a perpetual and persistent multi-user environment that merges physical reality with digital virtuality… it is an interconnected web of social, immersive networked environments on persistent multi-user platforms.

It is noteworthy that Metaverse is recognised as a disruptive technological emerging field brings a larger luxury brands market, resulting in the increase sales and awareness, changing in the global business market specifically of luxury brands [3].

In relation to the report of Metaverse market size worldwide 2022–2030, in 2022, it was estimated that the global metaverse market stood at 65.5 billion U.S. dollars. It is expected that in 2023 to rise to 82 billion U.S. dollars, before surging to 936.6 billion U.S. dollars by 2030. Regarded as the future internet era, the metaverse is where the physical and digital worlds come together [12].

According to Kim [19], the Metaverse represents the world of augmented reality (AR) that encompasses all the different forms of computer reality that are produced by it. AR therefore includes all aspects of the following 3 realities: (1) Augmented

Reality (AR)—Superimposes digital information on real-world scenarios. AR is applied when a mobile phone camera is used to translate signs and menus in real time from one language to another.

Johnson et al. [16] stated that, potentially, the main benefit of the Metaverse is to significantly improve luxury consumers' engagement with and loyalty to the brands they buy. Through Metaverse, luxury companies have the advantage of reaching a wider and more extensive target audience, comprising not only customers without access to physical shops, but also enabling the creation of virtual showrooms and product launches, and also to provide customers fully immersive experiences. Moreover, in several areas and sectors, artificial intelligence (AI) is increasingly used in management aspects, namely in optimising costs, increasing revenues and making it easier for customers to buy, generating higher levels of satisfaction [16]. An increasing number of companies, through marketing departments, are using a range of technological solutions applications for marketing to enhance business productivity and increase pleasurable consumer satisfaction [23].

> The concept of the Metaverse is being used by different companies to increase their sale revenue. Most luxury brands see this as a new opportunity to rebrand themselves to attract the young generation of customers from online communities. However, the Metaverse is developed too fast inits initial stage in which the basic setting and virtual communities are not perfect which results in its decline in 2022 [3, p. 533].

Currently, Metaverse users can meet, interact and socialise with each other by taking on the form of 3D avatars or holograms that are in physical or virtual spaces, however, they are limited to only being able to do so while on the same platform. The next step is for all of this to be equally possible, but without any restrictions. In order to have cross-platform and cross-technology interactions, with some users in VR and others in AR, the interconnection of software and the teleportation of users between different worlds, it is necessary that avatar customisation, i.e. the props and accessories that users buy for their avatars, are also portable between worlds [22].

The Metaverse aims to provide users with registered ownership of the props and accessories that make up avatars through decentralised and immutable technologies [17]. According to Parisi, the essential assumptions of the Metaverse are the following: (1) There should be only one; (2) It should be for every one; (3) Collectively controlled; (4) Open; (5) Hardware agnostic; (6) Networked; and (7) An internet interaction.

It is noteworthy that the Metaverse faces several challenges associated with AR, VR and MR technologies, which can have an influence on users' emotions and behaviours. Online gaming has been the main driver for luxury brands to enter the Metaverse world [7].

The visual language and social rules of interaction in the Metaverse have effectively been defined by games, which have always been the main candidates for VR. Elements of the Metaverse such as 3D avatars or world-building had already been incorporated in early immersive two-dimensional (2D) games such as Mine craft and Second Life. As the Metaverse can be considered a unified VR space, it creates a single interoperable environment for users by interconnecting various VR games.

Players can thus interact with the same players in multiple spaces simultaneously [5].

The Metaverse has been the target of major investments by gaming companies, tech giants and venture capitalists, much because they see the metaverse as the future of the gaming industry. Some of the key pioneers to watch out for are Decentral and, Sandbox, Epic Games. Decentral and is one of the first companies when it comes to trying to create a Metaverse. It has a 3D VR platform, a crypto currency based on Ethereum and distinct locations for multi-user games [25].

2.3 Market of Non-fungible Tokens (NFT)

NFTs can be any digital element or object, such as a work of art, an image, a song, a video, a video game, a virtual character, virtual fashion items or luxury brand content. These assets are traded through decentralised online market places, popularly referred to as Metaverses, which are virtual platforms in the form of playgrounds, available to all users, where NFT can be owned and used [10, 11].

Historically, comparing the value placed on digital goods to the value placed on physical goods, digital goods have received less value, largely due to their inability to create as strong a psychological connection in the consumer as physical goods do [1].

Luxury fashion brands have the competitive advantage of exploring new ways of creating revenue streams as well as remaining relevant for future generations [20]. For luxury brands, NFTs represent a panoply of opportunities, one of the main reasons being that they are a tool that verifies the authenticity and owner ship of an item [2].

The market for these types of NFT items is typically characterised by collectors or consumers looking for rare digital collectibles [8]. Another valuable use of NFT is the creation of digital skins for avatars in video games. In general, the relevance of fashion and luxury to gaming is that digital clothing is a vital part of the culture of that game, as it is a way of dressing avatars in the virtual world. Characterisation is so important to the player that in March 2021, the sale of 600 NFT trainers in a seven- minute auction period generated $3 million in revenue [8].

Recents findings Colicev [4] points out the way how can brands leverage NFTs in the stages of the marketing funnel to impact consumers along the marketing funnel, into three stages, such as: pre-purchase, purchase, and post-purchase stage.

According to Mar [21], the benefits that a luxury brand can achieve through NTFs are as follows: (1) Consumers of luxury goods in the Metaverse may become new customers of traditional physical goods in the future; (2) Gaining a new generation of customers, younger and who are not the usual traditional physical luxury piece buyers; (3) Ability to utilise the Metaverse as a platform for testing designs before putting them into physical production; (4) Sustainable nature of luxury coupled with technology in its production and distribution; (5) Creation of new revenue streams; (6) Utilisation of designs from past collections to convert into new virtual NFT assets, while spreading brand heritage; (7) High profit margins from the creation of digital NFT items that can be replicated infinitely for free and distributed for significantly less than their physical counterparts; and (8) Ongoing royalty rates due to future transactions of virtual NFT items as items change hands.

In addition to technologies that have already been used for some time, digital avatars or multi-player online games, the latest technological advances allow the purchase of various token-based non-fungible digital products, NFTs, thus opening doors to a new form of commerce [13].

The Sandbox economy is based on user-generated cryptocurrencies and NFT virtual assets and collaborates with global brands to provide unique and enriching experiences to its players. In the Sandbox marketplace it is possible to buy and incorporate NFT into your VR environment [26]. Epic Games' most well-known product is Fortnite, which is a VR game and an event venue in one. Artists from all over the world have performed shows utilising Fortnite's Metaverse features as the game's popularity has grown [15].

2.4 AI in Luxury Fashion: Revolutionizing Creativity and Operations

The incorporation of AI in the luxury fashion industry has led to a transformative wave that reshapes traditional paradigms of creativity and operational efficiencies. AI's role spans various key areas including design, manufacturing, marketing, and supply chain management. Notably, AI tools such as machine learning and deep learning are being utilized to detect new trends, thereby reducing estimating errors and enhancing the attractiveness of fashion designs.

2.4.1 Pioneering AI-Driven Design and Customer Engagement

Luxury fashion brands are leveraging AI to elevate the customer experience, employing interactive websites, chat bots, and AI-driven virtual stylists. These tools provide personalized product recommendations and enable virtual try-ons, there by enriching the shopping experience. Brands like Burberry use AI to detect counterfeit products, ensuring product authenticity and protecting brand integrity.

2.5 Ethical and Legal Considerations in AI Integration

The burgeoning use of AI in luxury fashion, while advantageous, begets complex ethical and legal considerations. Intellectual property rights and privacy concerns emerge as critical issues in the wake of AI's growing prominence. The legal domain grapples with the delineation of ownership between human and AI-generated designs, raising questions about the future of creative authorship in the fashion industry. Privacy concerns, particularly regarding the collection and usage of consumer data, necessitate a cautious and informed approach to AI implementation, ensuring compliance with evolving regulations like the General Data Protection Regulation (GDPR).

2.6 The Future Landscape of AI in Luxury Fashion

As AI continues to evolve and permeate various aspects of the luxury fashion industry, it presents a dualistic narrative of immense potential and inherent challenges. The fashion industry, while reaping the benefits of AI in consumer engagement and operational efficiency, must navigate the precarious terrain of legal and ethical ambiguities. This dynamic landscape warrants a nuanced exploration and understanding of AI's role in luxury fashion, necessitating further scholarly inquiry into its long-term impact on consumer behavior, ethical practice, and the legal framework governing its application.

2.7 Collaborative AI Models and Human-AI Interaction

Recent studies from Pusan National University highlight the use of collaborative AI models in fashion design, advocating for human-AI collaborative designing. This approach not only increases efficiency but also improves sustainability. However, there is a noticeable gap in research involving fashion designers directly in the AI design process (Tech Explore 2023). This calls for an expanded focus on human-AI collaborative networks and their potential to democratize fashion design, making it accessible to a broader range of creators (Tech Explore 2023).

2.8 Market Analysis and Growth Projections

The AI in Fashion Market is projected to grow significantly, reaching nearly US$ 6.57 Bn by 2029. This growth is driven by AI's role in enhancing consumer experiences, automating processes, and improving sustainability. The North American market, in particular, is developing policies and best practices for AI implementation in various industry sectors, including fashion. However, challenges such as data security, privacy concerns, and the lack of technological awareness pose hurdles to AI adoption in the Asia Pacific region.

3 Methodology

An exploratory qualitative methodology was performed, based on systematic maping study (SMS), both to analyse and to structure a broad research field concerning methods, designs and research. This methodological approach focused on scholarly papers published in renowned academic databases, such as: Web of Science, Emerald, Wiley, Science Direct, Scopus, Taylor and Francis, and Sage (among others), as well Google Trends data, human–computer data through the video sensory stimuli, VR/AR, and industry and professional reports properly evaluated and selected.

In this vein, several high updated renowned secondary data sources were used for the methodological purpose of describing and characterising the emerging themes of this study. There was a strict concern to obtain the most recent sources that could explain AI as a disruptive technology for strategic management of digital luxury brands after the pandemic crisis in 2020.

These crossed and interrelated methods have been used in this study, as they seem to be the most suitable methods to advance the main strategic and emerging issues, trends, challenges and factors related to the whole competitive advantage of the AI innovative technology and digital luxury brands industry.

This methodology "… integrates the set of studies in terms of themes, we are in a better position to describe current knowledge and practice, evaluate theoretical progress, identify gaps and weak points that remain, and plot a course for future research". The literature review has long been described as "a vital and popular technique in the consumer researcher's toolkit" [28].

4 Preliminary Results and Discussion

The integration of Non-Fungible Tokens (NFTs) and the Metaverse into luxury brand marketing represents a significant shift in the industry, driven by technological advancements and evolving consumer behaviors. This analysis synthesizes insights from various sources to provide a comprehensive understanding of the impact of these technologies on luxury brands.

Impact of NFTs on Luxury Brand

1. Umyique Identification of Digital Assets: NFTs offer luxury brands the unique ability to identify digital assets distinctly. This characteristic is vital as luxury has always intersected with culture and art, making NFTs a logical extension for these brands [27].
2. Targeting Younger, Digital-Savvy Audiences: NFTs are seen as a tool to appeal to a younger demographic, notably Generation Z and millennials. These groups have been pivotal in disrupting the luxury sector, evidenced by trends like luxury sneakers and backpacks [27].

3. Enhancing Customer Engagement: Luxury brands are leveraging NFTs to cultivate meaningful experiences through storytelling, engaging and capturing their customers on digital platforms [27].
4. Strategic Necessity and Risks: A well-thought-out strategy is crucial for successful NFT initiatives. Brands that misunderstand NFTs or launch them without a deep strategy risk damaging their brand equity [27].
5. Potential for Long-Term Success: Successful NFT projects will be those that think long-term and prioritize community engagement. In contrast, opportunistic or trend-based approaches might not yield sustainable results [27].

Impact of the Metaverse on Luxury Brands

1. A New Frontier for Exclusivity: The Metaverse provides an ideal platform for luxury brands to offer exclusive, rare experiences and access to limited-edition products through virtual reality and immersive technologies. This capability aligns well with the luxury market's focus on exclusivity and status signaling [6].
2. Blurring the Lines Between Real and Digital Worlds: Luxury brands are encouraged to adopt a structural approach to the Metaverse as it blurs the boundaries between real and digital worlds. This shift necessitates a reimagining of customer experiences and brand engagement strategies [18].
3. Adapting to a Changing Landscape: The success of luxury brands in the Metaverse will depend on their ability to adapt to this new environment. This involves investing in new technologies and creating unique, engaging experiences that resonate with consumers [6].
4. Balancing Innovation and Brand Identity: As luxury brands navigate this new digital terrain, maintaining brand equity and creativity is crucial. They need to strategically explore this channel without undermining their established brand identity [18].
5. Investor Interest in the Metaverse: Investors are increasingly viewing luxury companies as a means to indirectly invest in the Metaverse, recognizing the potential for significant growth and profitability in this new digital domain [18].

The adoption of NFTs and the Metaverse presents luxury brands with unprecedented opportunities and challenges. To capitalize on these technologies, brands must develop a deep understanding of their strategic implications, create meaningful digital experiences, and maintain their core values of exclusivity and luxury. The successful integration of these technologies will likely redefine the future of luxury brand marketing, offering new avenues for growth and customer engagement.

5 Final Considerations

In this scholarly treatise, we endeavour to elucidate the nascent yet burgeoning intersection of Artificial Intelligence (AI), the Metaverse, and Non-Fungible Tokens (NFTs) within the ambit of digital luxury branding. This exploration delineates a trajectory for future empirical investigations, positing recommendations that are both methodologically robust and intellectually stimulating, thereby advancing the discourse in this avant-garde domain.

Foremost, it is imperative that subsequent empirical endeavours rigorously scrutinize the ramifications of AI integration in the luxury digital milieu. This should encompass a multifaceted quantitative and qualitative analysis, scrutinizing metrics such as consumer engagement indices, alterations in brand valuation, and sales trajectories post-AI induction. This analysis should be underpinned by a methodologically sound framework that allows for a holistic understanding of AI's efficacy in this exclusive sector.

The corpus of future research should be enriched with detailed case studies, dissecting instances of successful AI assimilation within luxury brands. These explorations should meticulously chronicle the strategic manoeuvres, encountered obstacles, and tangible outcomes, thereby offering a perspicacious understanding of AI's operational dynamics within this niche.

An exploration into how NFTs and the Metaverse are being leveraged by luxury brands warrants meticulous investigation. This should include an in-depth analysis of consumer perceptions surrounding digital ownership, and an exploration into pioneering approaches that luxury brands can adopt to enhance consumer experiences within these novel digital realms.

Acknowledging and addressing the current study's limitations is pivotal. Future research should aim to articulate strategies that adeptly bridge the experiential chasm between the tangible and intangible luxury realms, ensuring a harmonious and seamless luxury experience that transcends the physical and digital dichotomy.

As AI burgeons in prominence, ethical quandaries and consumer privacy concerns ascend to the forefront. Future scholarly works should delve into the ethical conundrums presented by AI in luxury branding, especially concerning data utilization, consumer profiling, and the potential societal repercussions of AI-driven exclusivity.

To unravel the enduring effects of AI integration, longitudinal studies are quintessential. These should systematically track and analyse shifts in brand perception, consumer fidelity, and brand equity over an extended temporal continuum, thereby shedding light on the long-term sustainability and viability of AI-driven strategies within the luxury sphere.

The impact of AI in luxury branding is not monolithic and varies across different cultural contexts. Future scholarly endeavours should engage in a comparative analysis across variegated global markets to discern how cultural nuances and idiosyncrasies shape and modulate the efficacy of AI-driven luxury branding strategies.

In summation this study has meticulously unraveled the depth of AI, the Metaverse, and NFT technologies within the digital luxury brand arena. The key findings illuminate the transformative potential of these technologies in redefining the paradigms of luxury brand management and marketing.

The integration of AI offers unprecedented insights into consumer behavior, enabling luxury brands to tailor experiences with refined precision. This personalization, while upholding the exclusivity intrinsic to luxury branding, opens new avenues for customer engagement and loyalty. The advent of the Metaverse, a digital universe of boundless potential, offers luxury brands an innovative platform to create immersive and interactive brand experiences. This not only extends the reach of luxury brands beyond physical confines but also introduces novel opportunities for storytelling and consumer connection.

NFTs emerge as a pivotal technology in reimagining the concept of ownership and value in the digital space. For luxury brands, NFTs provide a unique medium to merge art, fashion, and technology, creating exclusive digital assets that cater to the evolving preferences of a digitally-savvy clientele.

For luxury brand managers and marketers, these insights signal a shift towards a more digitally integrated approach. Embracing these technologies is no longer optional but a strategic imperative to stay relevant in an increasingly digital-centric consumer landscape. This involves not only investing in these technologies but also cultivating a deep understanding of their dynamics and potential impact on consumer perceptions and brand value.

In essence, the study underscores the pivotal role of AI, the Metaverse, and NFTs in charting a new course for the digital luxury brand industry. It presents a compelling case for these technologies as critical drivers of innovation, engagement, and growth in the luxury sector. The implications of this research are far-reaching, offering a visionary lens through which luxury brands can navigate and flourish in the digital era. This study not only contributes significantly to the academic discourse on luxury branding in the digital age but also serves as a strategic guide for practitioners in the field, marking a seminal step in the evolution of luxury brand management.

Acknowledgements This work was financially supported by the Research Unit on Governance, Competitiveness and Public Policies (UIDB/04058/2020) + (UIDP/04058/2020), funded by national funds through FCT-Fundação para a Ciência e a Tecnologia

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