

MetaWOM – Towards a Sensory Word-of-Mouth (WOM) in the Metaverse

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Abstract

Purpose - Based on the key dimensions of the Metaverse environment (*immersiveness, fidelity, and sociability*), this paper develops the concept of sensory Word-of-Mouth (WOM) in Metaverse - the *metaWOM*. It attempts to upgrade the Reviewchain model and suggests the utilization of non-transferable tokens (NTT) in curbing the explosion of fake WOM.

Design/methodology/approach - Following Macinnis' (2011) approach to conceptual contributions, we browsed the currently available literature on WOM, Metaverse, and NTT to portray the emergence of metaWOM.

Findings - By relying on Metaverse's three building blocks, we map out the persuasiveness of metaWOM in the Metaverse-like environment. By incorporating NTT in the Reviewchain model, we upgraded it to provide a transparent, safe, and trusted review ecosystem. An array of emerging research directions and research questions is presented.

Implications – This paper comprehensively analyses the implications of a Metaverse-like environment on WOM and debates on technologies that can enhance the metaWOM persuasiveness. The proposed model in this paper can assist various stakeholders in understanding the complex nature of virtual information-seeking and giving.

Originality/value - This is the original attempt to delineate the sensory aspect of WOM in the Metaverse based on three crucial aspects of the Metaverse environment: *immersiveness*, *fidelity*, and *sociability*. This paper extends the discussion on the issue of fake reviews and offers viable suggestions to curb the ever-growing number of fraudulent WOM.

Keywords: Metaverse, Word-of-Mouth, media richness theory, WOM, metaWOM, sensory, persuasiveness, credibility, NTT, Reviewchain, hospitality, tourism

Paper type: Conceptual Paper

1. Introduction

The Metaverse can be defined as a virtual world where avatars come together to work, shop, attend classes, pursue hobbies, and enjoy social gatherings (Giang Barrera and Shah, 2023). Avatar may be defined as a virtual representation of an individual user. The digital world is changing rapidly, and many companies are investing important resources to offer their versions of virtual three-dimensional Worlds (Metaverses) for business and casual peer-to-peer communication (Dwivedi *et al.*, 2022). Nowadays, users can access the Metaverse through their

internet browsers, smartphones, and VR sets. Given its rapid development, the Metaverse-like environment is expected to significantly impact daily lives in the same way as the introduction of the internet or the iPhone did (Wiederhold, 2022). Moreover, the literature claims that technological advancement, in the form of augmented reality (AR), virtual reality (VR), and non-transferable tokens (NTT), will greatly transform various aspects of our life (Dwivedi *et al.*, 2023a; Giang Barrera and Shah, 2023; Koohang *et al.*, 2023; Kshetri and Dwivedi, 2023; Mehran *et al.*, 2023; Wongkitrungrueng and Suprawan, 2023), and more specifically the way we communicate.

With VR and AR, Metaverse will allow everyone to create avatars and engage in virtual communications (Zeng *et al.*, 2020; Wongkitrungrueng and Suprawan, 2023), including WOM. Notably, the Metaverse has the potential to revolutionize service sectors, such as the travel and tourism industry (Abdullah *et al.*, 2022; Castillo-Manzano *et al.*, 2022; Buhalis *et al.*, 2023; Zhang *et al.*, 2023). For illustration, hotels create immersive virtual experiences to provide potential guests with a taste of what their stay might be like. To date, a growing number of service providers and stakeholders leverage the VR and the Metaverse – to name a few: Marriot, City of Dubai, City of Seoul, Thomas Cook Airlines, Prada, IKEA, Nova Scotia, Hamilton islands, etc. (Yang *et al.*, 2017; Buhalis *et al.*, 2023; Cheng *et al.*, 2023; Dwivedi *et al.*, 2023b). Travelers can take virtual tours of hotels and rooms, customize their stay by previewing different amenities, and even book their entire trip within the Metaverse. As travelers' behavior, and VR evolves, Metaverse is to take a more disrupting role in areas such as marketing, communication, service provision, and the like (Gursoy *et al.*, 2022; Tan *et al.*, 2023).

However, the current WOM knowledge is limited to traditional two-dimensional platforms (e.g., Trust Pilot) or social media websites (Filieri *et al.*, 2018a; Filieri, 2016;

Mladenović *et al.*, 2020; Skiera *et al.*, 2022) and does not reflect the immersive nature of Metaverse-like environments. Given the depth and breadth of the environment, the behavior will hypothetically change (Belk *et al.*, 2022), and the domain knowledge, although rapidly evolving, is still scattered and inconclusive. This change in the WOM ecosystem may affect companies that invest in WOM and users that would have to deal with new immersive channels to share and seek information and opinions of others in a more sensorial manner. It is predicted that haptic devices will allow users to “*feel*” objects and additional equipment that enables any kind of physical activity in Metaverse (Dwivedi *et al.*, 2022; Wiederhold, 2022). The whole sensory experience in the Metaverse is anchored in high environmental fidelity, immersiveness, and sociability (Giang Barrera and Shah, 2023).

Still, to date, some of the central issues related to WOM are credibility and the helpfulness of WOM (Filiari, 2016; Ismagilova *et al.*, 2020). These issues are anchored in the anonymous nature of the online environment and an overwhelming amount of fraudulent WOM (Filiari, 2016). Several scandals have affected the world's largest traveling platform, Tripadvisor, causing a decrease in the perception of the level of reliability of online reviews (Filiari, 2016). As such, some online review platforms are cluttered with fake and promotional online reviews (Banerjee and Chua, 2021; Filiari, 2016) – affecting the trust, credibility, and, consequently, helpfulness of WOM messages. As a potential remedy, a novel decentralized technology can hypothetically induce higher trust of WOM in Metaverse. Non-transferable token (NTT) is a cryptographic and blockchain-based asset *with unique identification codes and metadata that can not be transferred between wallets* (Peres *et al.*, 2022). From the WOM perspective, each message (e.g., review, testimonial, etc.) will be with unique identification code and related to its owner (generator), which will make it more challenging to manipulate WOM in the Metaverse

(O'Brien, 2021; Román *et al.*, 2023). As individuals rely heavily on WOM in making informed travel-related decisions (Buhalis *et al.*, 2023; Filieri, 2016), the importance of further conceptualization and investigation of WOM is part of the proverbial equation.

While the whole domain is in its infancy, several scientific contributions portray the current state of affairs in the Metaverse context (Dwivedi *et al.*, 2022; Giang Barrera and Shah, 2023; Koohang *et al.*, 2023, Tan *et al.*, 2023). There is a consensus among scholars on the major paradigm shifts in the domains of consumer behavior, interpersonal and branding communication, and decision-making. While marketers are interested in WOM, the Metaverse interactive environment would induce a more complex WOM format - toward more sensory, experiential, and haptic WOM – an array of unexplored features that bring new challenges and opportunities (Cheng *et al.*, 2023).

This contribution aims to extend the current conceptualization of WOM to the Metaverse. Having this in mind, we present and discuss how three dimensions of the Metaverse may affect WOM and create additional value for all involved stakeholders (e.g., hotels, marketers, tourists, users, avatars) by (1) increasing the helpfulness and credibility of WOM and (2) by being more persuasive. We illustrate how *metaWOM* may be related to the innovative concept of NTT. Moreover, we discuss the consequences of multiple Metaverses that currently exist (Buhalis *et al.*, 2023). Lastly, we propose a set of innovative research directions to spark future developments and empirical verifications.

2. Methodological remarks

To understand the dimensions of the Metaverse and their interplay with WOM, we rely on Macinnis' (2011) three-phase procedure. Firstly, we found over 110 domain-relevant articles

in the last 16 years. Although the spike in scientific production is recent, we selected this time window to check for eventual pre-trends and to grasp the broader context. The collected material was screened based on the relevancy and research focus: WOM, Metaverse, persuasiveness, and user experience. A fraction of the originally retrieved articles were suitable for further investigation. According to Macinnis (2011), the second step is the integration in which we provide definitions of critical aspects of a Metaverse-like world and WOM. The primary goal of this phase is to present a helicopter view of the observed phenomena. Therefore, we integrate the digital disruptions that impacted consumer behavior and communications, such as WOM. The delineation phase focuses on understanding the relationship between Metaverse's dimensions (research focus) and other concepts (WOM persuasiveness). This phase aims to understand how these dimensions will affect the persuasiveness of WOM in Metaverse-like environments.

3. Literature review

3.1 Metaverse and Media Richness Theory (MRT): A New Paradigm for Word of Mouth

Given its main postulates Media Richness Theory (MRT), developed by Daft and Lengel (1986), presents a suitable theoretical frame for the further exploration of WOM in the context of Metaverse. MRT proposes that communication effectiveness is notably tethered to the “richness” of the medium that conveys the message (Daft and Lengel, 1986). The richness is defined by four primary attributes: cues, language variety, personal focus, and feedback capabilities (Daft and Lengel, 1986; Maity *et al.*, 2018; Zeng *et al.*, 2020). In terms of Metaverse-like environments, the multidimensional richness may be particularly suitable as Metaverse technically provide an unprecedented level of sociability, immersiveness, and fidelity (Giang Barrera and Shah, 2023). Notably, MRT is convenient for exploring WOM in the Metaverse, as Metaverse is considered a “rich” medium as per MRT - by enhancing robust and diverse

communication within its multifaceted and multilayered context. Secondly, prompt feedback and interactive dialogue within virtual worlds should bolster the richness and persuasiveness of the communication – which may be critical for WOM efficacy. Lastly, the sense of “presence” within Metaverse can engender more personalized experiences – consequently influencing the persuasive power of WOM. By relying on MRT, we believe that the richness aspect is a relevant framework through which the complex interplay between the Metaverse and WOM can be mapped.

3.2 Traditional WOM, eWOM, and metaWOM

WOM has long been a powerful force in shaping consumer behavior, and abundant scientific evidence argues its impact on one’s decision-making (e.g., Filieri *et al.*, 2018b). Individuals often rely on the recommendations of their friends, family, and peers when making decisions (Filieri, 2016). In recent years, however, the rise of digital technology has disrupted how WOM functions, leading to new channels and formats - known as eWOM (Filieri *et al.*, 2018a).

One of the main ways that digital technologies have disrupted WOM is by making it easier for people to share their experiences and opinions (Yang *et al.*, 2017; Kim *et al.*, 2021). WOM was typically limited to personal connections between individuals. With social media and online review platforms, people can share their experiences with a much larger audience (Ismagilova *et al.*, 2021). This has made service providers (e.g., hotels) more exposed to both positive and negative feedback. Secondly, the digital environment has made it easier for people to access information about products and services (Filieri, 2016; Lee and Choi, 2019). Now it is possible to find customer reviews for every product online (Filieri, 2016). This can make it more difficult for companies and service providers to control the available information, as consumers

can easily access a wide range of opinions and reviews from various sources. Overall, the technological disruptions triggered by digital technologies have had a significant impact on the way people share opinions and feedback about companies (i.e., WOM) and have changed the way companies manage their (online) reputation (Craciun and Moore, 2019; Iyer *et al.*, 2017). Online review platforms, social media, influencers, and marketers' efforts have all contributed to the rise of eWOM, which reaches a broad audience and have a greater influence on consumer behavior than WOM.

Nevertheless, scholars envisage further paradigm shifts in virtual settings (Ahn *et al.*, 2022; Dwivedi *et al.*, 2022; Kim, 2021; Mehran *et al.*, 2023; Giang Barrera and Shah, 2023), but less has been said about how the Metaverse could influence WOM. The Metaverse is a virtual space created by the convergence of virtual worlds and is accessible to users through the internet (Buhalis *et al.*, 2023). A novel type of social space that has the potential to transform how users interact with each other, brands, objects, and how they experience travel. Given its key features - *fidelity, sociability, and immersiveness*- (Giang Barrera and Shah, 2023; Mehran *et al.*, 2023), the Metaverse can be a productive ground for the further evolution of interpersonal communications about products and services (e.g., WOM).

Broadly speaking, the Metaverse has the potential to amplify, accelerate, and shape WOM in three major directions. First, the Metaverse allows users to interact with each other in a more immersive, engaging, and (eventually) effective way than it was possible in the real world or through online reviews, and social media platforms. The exponential growth of engagement is expected to lead to stronger relationships and build trust between users (Javornik *et al.*, 2021), which could lead to more helpful and credible WOM. Secondly, the immersive nature of the Metaverse allows for the creation of virtual communities centered around specific interests (e.g.,

low-cost travel), activities, lifestyles, or brands (e.g., destination brands). As communities are the backbone of every social network (Lee and Choi, 2019), the community can be very influential in a Metaverse-like world. As Metaverse induces more sensory and multi-format WOM, the information richness will increase - and so assumably its persuasive power (Filiari et al., 2021).

Lastly, the Metaverse itself allows for the creation of so-called virtual experiences that are highly engaging (Buhalis *et al.*, 2023) as the experience itself is based on major gamification principles (immersiveness, fidelity, and sociability). Consequently, users (avatars) with a positive (or negative) experience should be inclined to disseminate such an experience further – eventually leading to WOM’s spill-over to real-life environments (e.g., face-to-face or online).

In addition to these technologically-related changes, WOM has also been influenced by shifts in societal norms (Lee and Choi, 2019; Mladenović *et al.*, 2020). Individuals increasingly receive recommendations and appreciate diverging inputs from people who are not part of their immediate social circle (Lee and Choi, 2019) – and the Metaverse presents an excellent environment to fulfill this need. Overall, by strengthening relationships through immersive experiences, the Metaverse could become a powerful force in shaping and driving peer-to-peer communication. To lay the foundation and advance the understanding of the WOM phenomenon in the Metaverse, we propose a definition of metaWOM: *metaWOM refers to seeking, sharing, and passing of avatar-generated consumption experiences performed within the boundaries of immersive virtual environments.*

Table I From WOM to metaWOM (Source: Authors)

	Type		
	WOM	eWOM	metaWOM
Medium	Talk, personal meeting	SNS, discussion forums	Virtual environment

Type of interaction	Face-to-face	Online	Immersive
Easiness of transmission	Difficult	Easy	Not possible
Communication format	Speech	Video, image, graphics, testimonials, etc.	Immersive experiences
Communication	One-to-one	Many-to-many	One-to-one; One-to-many; many-to-many
Synchronicity	Synchronicity	Synchronous or Asynchronous	Synchronous or Asynchronous
Reach	Limited	Broad	Broad
Diffusion speed	Slow	Fast	Fast
Verification	Low to High	Low	High
Privacy	Private	Public	Both
Accessibility	Low	High	High
Credibility	High	Low	High
Social ties	Strong	Weak	Both
Engagement	High	Low	High
Persuasiveness	High	Low to High	Low to High
Immersiveness	n.a.	n.a.	Low to High
Fidelity	n.a.	n.a.	Low to High
Sociability	Low to High	n.a.	Low to High
Technology	n.a.	Opinion-sharing platforms	Blockchain
Sensorics	n.a.	n.a.	Low to High
Can be modified	Yes	Yes	No
Non-consumers generate WOM	Yes	Yes	No
Consumers have data on the WOM reliability	Partially	Partially	Yes
A central authority manages the WOM	No	Yes	No
Cooperation between vendors and consumers is possible	Yes	Yes	Partially*

Notes: n.a.- not applicable; bolded are significant differences; *The risk of collusion between vendors and consumers cannot be completely removed.

4. Role of Fidelity, Immersiveness, and Sociability in Shaping WOM's Persuasiveness

The literature is vocal in portraying that WOM communication is an important information source that greatly aids consumers in the decision-making process (Buhalis *et al.*,

2023; Filieri, 2016; Tsao and Hsieh, 2015). Notably, it is found to be more credible and relevant to consumers in comparison with traditional marketer-generated information (Babić *et al.*, 2020). To date, several studies investigated the persuasiveness of WOM communications, which is linked to the credibility and helpfulness of the information provided (Filieri, 2016). WOM credibility is defined as the degree to which an individual considers communications from others as believable, true, or factual (Verma *et al.*, 2023). Perceived credibility of information leads to higher confidence in the adoption of WOM and its use of it when making decisions (Filieri, 2016). It was found that some factors, such as content, recommendation consistency, expertise, perceived social relationships, and prior knowledge of the receiver, affect WOM credibility (Filieri, 2015; Verma *et al.*, 2023). Moreover, helpfulness refers to the degree to which information aids consumers in making decisions. Helpful WOM affects consumer decisions more than other types of information (Ismagilova *et al.*, 2020). Reportedly, a plethora of factors affects the helpfulness of WOM: the quality of the message, the rating score, the valence, the volume, as well as the expertise and trustworthiness of the source (Filieri *et al.*, 2018b; Filieri *et al.*, 2021; Ismagilova *et al.*, 2020; Verma *et al.*, 2023).

Yet, these factors are relevant for the face-to-face WOM and eWOM (e.g., online reviews, posts, influencers) and completely oversight the immersive environments. To date, no attempt has been made to decipher the role of three central dimensions (immersiveness, sociability, fidelity) on WOM communication in the Metaverse. These three aspects induce novel layers of experience and completely shift users' perceptions and actual behavior (Belk *et al.*, 2022; Giang Barrera and Shah, 2023). Essentially, it is expected that users engage differently with such an immersive environment – providing both challenges and opportunities for marketers (e.g., new channels and environment) and users (e.g., a more engaging environment

with no physical limitations). In the following sections, we discuss how immersiveness, sociability, and fidelity may affect WOM and, consequently its perceived persuasiveness in the Metaverse.

4.1 The critical role of immersiveness in managing persuasive WOM

Scholars discuss that users' immersion in virtual worlds occurs when individuals perceive being physically present in a nonphysical world (Ying *et al.*, 2022). In the tourism context, it implies activities and environments that provide a sense of complete immersion in a particular atmosphere or narrative (space trips, bungee jumping, virtual tours, sightseeing, etc.). This perception is created by surrounding the user with images, sound or other stimuli that provide a very absorbing environment. Spatial immersion occurs when a user perceives a virtual world so realistic and authentic that he/she feels that it is there, whilst immersiveness is induced by technological equipment that can manipulate the degree of so-called telepresence (Zeng *et al.*, 2020, Mogaji *et al.*, 2023). Still, caution is needed because the various levels of embedment are possible due to many possible levels of immersiveness. In the early days, Steuer (1992) argued that vividness and interactivity push users to "feel immersed". For illustration, the currently available Metaverse-like world accessible through PC (Decentraland) provides a low-immersive environment (Tan *et al.*, 2023). Whilst Metaverse, given that a headset (Somnium Space) reproduces a more immersive experience, provides a full experience of such an interactive environment.

Essentially, higher perceived immersiveness stimulates behavioral intentions, perceived value, value co-creation, and positive attitudes (Harz *et al.*, 2022; Kinzinger *et al.*, 2022), and it should be associated with the outcome variable. For instance, imagine the WOM message about immersive zip-lining experience through a dense forest. A high-immersive context should be

more impactful and persuasive than the WOM message shared in low-immersive environments. Consequently, immersiveness as a new dimension should significantly affect the WOM generation (e.g., composing information-rich WOM messages) and retrieval (e.g., how to find and consume WOM information) in the Metaverse. Additionally, the immersiveness would have implications for content communicated through WOM. For instance, WOM in high-immersive environments should provide richer information formats (e.g., heuristic cues, contextual cues, and level of details), while the opposite should be true for low-immersive environments given their modest capabilities. As the richness of information is recognized as a strong predictor of WOM persuasiveness (Filiery *et al.*, 2021; Ismagilova *et al.*, 2020), it is assumed that the high-context nature of WOM in high-immersive environments will produce a similar effect.

4.2 How sociability interplays with WOM in the Metaverse?

An array of social factors that have some impact on WOM engagement and user experience (social ties, trust, homophily, conformity, etc.) (Chu and Kim, 2011; Filiery, 2016; Filiery *et al.*, 2018a; Lee and Choi, 2019; Mladenović *et al.*, 2020; Filiery *et al.*, 2023; Chakraborty *et al.*, 2023). Kreijns *et al.* (2007) define sociability as the user's perception of an environment's ability to produce interactive social space and to induce social interactions. To date, social presence is one of the crucial dimensions to trigger user engagement and enhance their experiences in virtual worlds (Buhalis *et al.*, 2023; Ying *et al.*, 2022). Given that Metaverse-like worlds are expected to be heavily populated (Belk *et al.*, 2022), such an interactive and immersive environment should provide various venues and levels of sociability. Small, unknown, and unpopulated Metaverse worlds would be very restrictive in terms of sociability options. While the opposite should be valid for large, heavily populated, and well-structured Metaverses, as those would trigger higher interaction levels between users/avatars.

Essentially, socialization is a strong motive for users to engage with virtual communities. Individuals are social beings, and virtual communities provide a platform to connect with like-minded people (Chakraborty *et al.*, 2023; Dwivedi *et al.*, 2023b). Through Metaverse-like worlds, users can share their experiences, seek advice, and engage in discussions with others who share similar interests, leading to a sense of community and socialization that can potentially positively impact their mental and emotional well-being. Regarding user-generated content, various motives influence users' information sharing (Filiari *et al.*, 2021) and value co-creation with others (Buhalis *et al.*, 2023). In general, higher user engagement in virtual worlds can be triggered by the increased number of social venues to trigger the socialization process (Javornik *et al.*, 2021; Scholz and Smith, 2016). Metaverse environments that provide richer sociability options and contextual factors will foster frequent, stronger, and more intense information exchanges and, consequently, WOM. The persuasiveness of WOM in such environments would be high given that consumers tend to conform to the norms and behaviors of others in the same online community (Forman *et al.*, 2008). As in the real world, users are prone to form various social groups or communities (e.g., usually with problem-solving purposes) spontaneously (Lee and Choi, 2019). However, it is also true that group relevance, immediacy, and presence are greater when individuals feel that fellow group members are closer in space and time (Latané, 1981), which is not the case in the metaverse where individuals are geographically and culturally sparse and do not necessarily feel the need to conform to any norm or behavior in a process of de-identification.

4.3 How 3D fidelity transforms WOM in Metaverse?

In terms of virtual worlds, environmental fidelity may be defined as the degree to which Metaverse stipulates physical and functional aspects of the real-world (Giang Barrera and Shah,

2023). It is a rather complex dimension that includes two elements of display and interactive fidelity. Display fidelity implies the level of reproduction of various sensory stimuli so that users/avatars in the Metaverse can speak, hear, feel, see, and touch (Steuer, 1992). Interactive fidelity is how realistically users interact with others, objects, or during events (McMahan *et al.*, 2012). Originally, media richness theory postulates that the breadth and range of these cues have an additive effect on behavioral intentions (Trevina *et al.*, 1987). Combined, display and interactive fidelity should provide a Metaverse experience based on full two-way interaction (Ahn *et al.*, 2022). Essentially, when technologies induce high levels of environmental fidelity, users would be naturally more engaged with such communal environments (McMahan *et al.*, 2012). For illustration, if users could move and touch objects in a virtual museum, and feel and smell the mysterious aroma of a jungle trip in the Metaverse, individuals would be more engaged with such a sensory-rich environment (Cheng *et al.*, 2023). Contrarily, if the fidelity level is low, users would be less likely to frequently, intensively, and constructively engage with the environment – resulting in a shallow virtual experience.

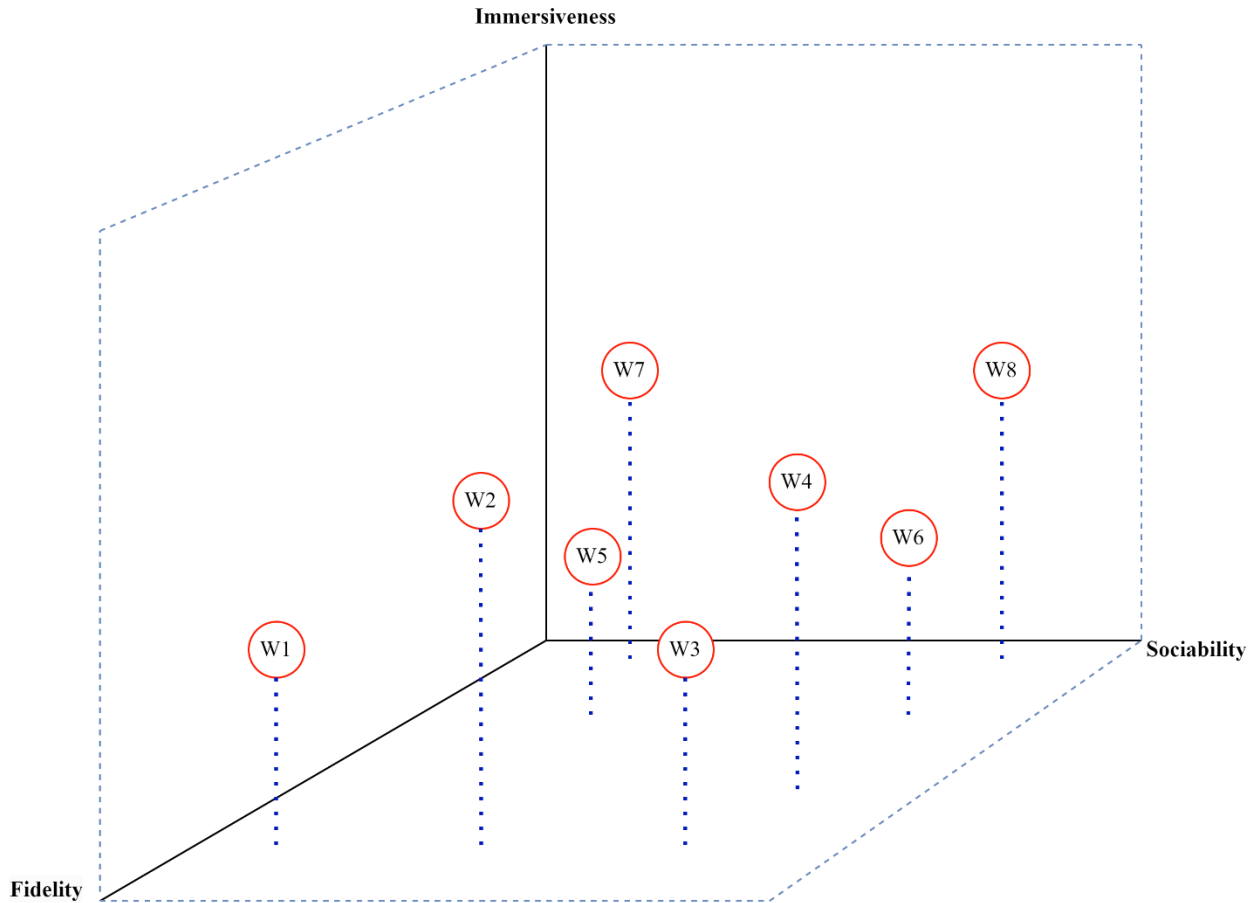
Presumably, fidelity is a decisive dimension as it invasively pushes the research frontier toward sensory WOM. This may be decisive for hospitality and tourism, as they would need to incept as many details as possible in their offerings to provoke the user's sensory experience. Thanks to immersive technologies, the sensory aspect of WOM (although neglected to date) is an emerging topic (Babić Rosario *et al.*, 2020). Potentially, users could reproduce their experiences by attaching additional cues to their WOM message (e.g., smell, positioning of objects and users, their feelings, immediate reactions, etc). A substantial shift from the current understanding and concepts of WOM and eWOM. Notably, the sensory feature makes metaWOM a more complex concept than WOM and eWOM typologies (both in the context of generation and retrieval of

WOM). As the sensory features provide additional cues, context, and circumstantial pieces of information, WOM in high Metaverse-fidelity condition (high display and interactive fidelity) is presumably to be perceived as more helpful and relevant. Consequently, metaWOM could be more significantly associated with outcome variables (e.g., purchase, booking, sharing, etc.) and generally more persuasive.

4.4 MetaWOM Typology

By combining various levels of immersiveness, sociability, and fidelity, Metaverse environments provide a fertile environment to boost users' engagement and enhance user experience (Buhalis *et al.*, 2023; Flavián *et al.*, 2019; Javornik *et al.*, 2021). Thereupon, marketers and users have many opportunities to generate, manage, and retrieve WOM in Metaverse. The major typologies with background rationale are presented in Figure 1, and the figure indicates only an abysmal portion of the total spectrum of possible combinations.

Figure 1 Variations of metaWOM based on Metaverse experience (adapted from Giang Barrera and Shah, (2023))



Variation	I	F	S	P	Rationale
W1	Low	High	Low	Low	Lower levels of sociability and immersiveness nullify the effect of fidelity (Metaverse-like worlds in which social space does not provide ample opportunities for socialization). Accessible through a browser (Nemesis), and WOM generated and retrieved in provides limited embeddedness and interactivity.
W2	High	High	Low	Medium	Modest sociability levels restrict socialization (although the Metaverse environment is engaging but not populated). On the contrary, high immersiveness and fidelity induce user engagement.
W3	Low	High	High	Medium	These Metaverses are accessible only via mobile devices and browsers and provide a modest user

					experience. Given that users cannot fully embed themselves in someone's experience, a moderate persuasiveness of WOM is expected.
W4	High	High	High	High	Ideal for both marketers and users as the Metaverse provides an interactive environment for WOM generation and retrieval. It is expected that WOM is persuasive, effective, and provides a full sensory experience.
W5	Low	Low	Low	Low	The Metaverse-like environment is unpopulated, poor in design, and accessible only in browsers. The role of such a Metaverse-like environment on WOM is limited and provides only a modest sensory experience.
W6	High	Low	Low	Low	The Metaverse does not provide an environment to engage with others and share experiences. It requires a lot of effort to populate and design the environment to motivate users' engagement with objects and avatars.
W7	Low	Low	High	Low	This is a dominant case as the majority of Metaverses may be categorized here (accessible only via a browser with modest aesthetics). Those are very populated (Sandbox, Decentraland, etc.). Poor immersiveness and fidelity do not contribute to the generation and retrieval of sensory WOM.
W8	High	Low	High	Medium	Poor display and interactive fidelity affect the user experience and their engagement with environments (not being able to feel, move objects, etc.). Avatars lack a crucial aspect in sensory WOM, to sense it. Therefore, the limited persuasiveness of WOM is to expect.

Notes: I=immersiveness; F=fidelity; S=sociability; P=persuasiveness

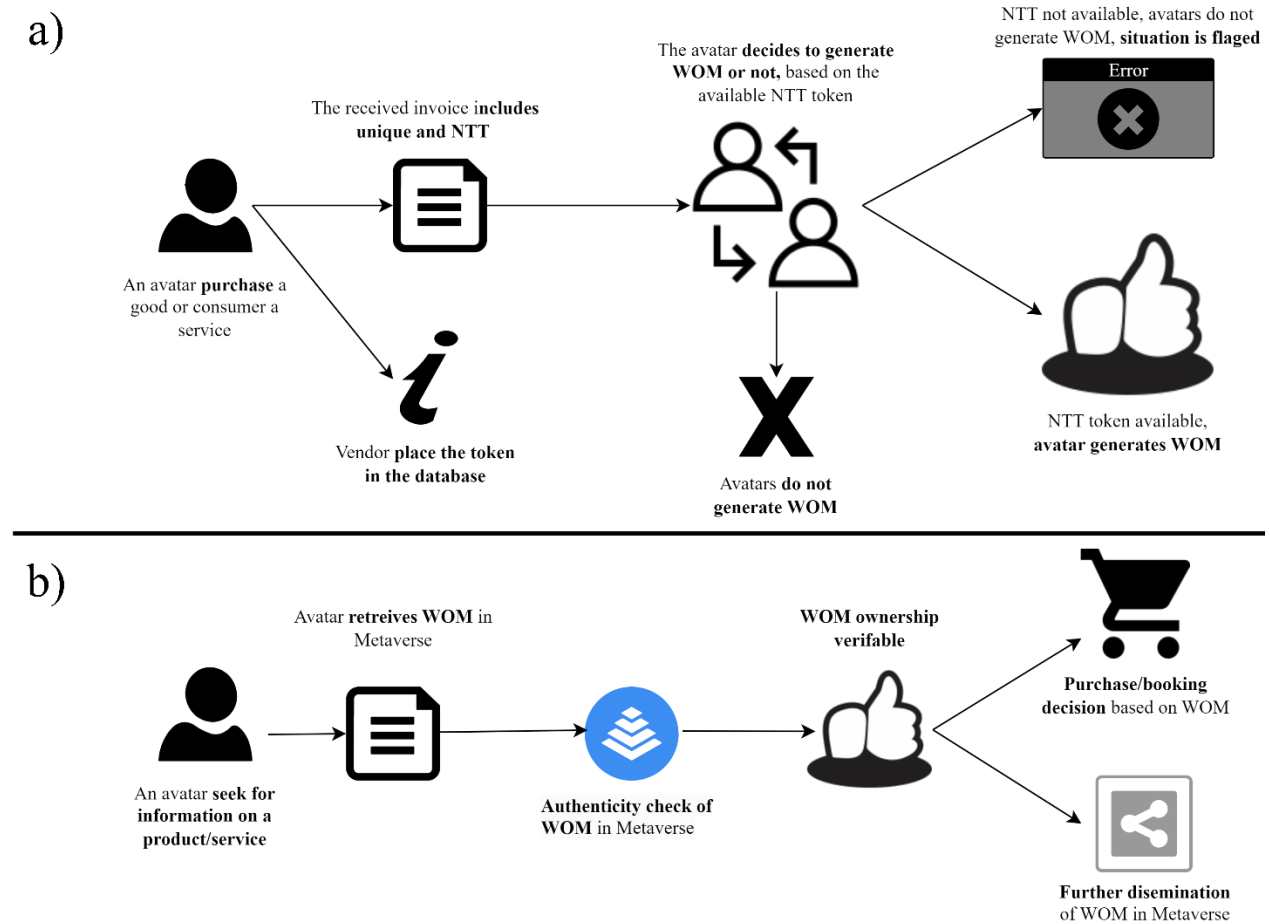
5. The Pivotal Role of NTT in Increasing WOM's Persuasiveness in Metaverse

In face-to-face or online environments, consumers must rely on two crucial elements that are involved in WOM – the generators (e.g., source) and online platforms that manage WOM in a digital environment (e.g., TripAdvisor, Booking, etc.) (Babić Rosario *et al.*, 2020; Donthu *et al.*, 2021). The major issue is that platforms often exclude unfavorable reviews, amend existing reviews, or worse, produce fraudulent (fake) reviews (Filieri, 2016; Banerjee, 2022; Román *et al.*, 2023; Vasist and Krishnan, 2022) – with the main goal to support the performance of their

offerings. This issue has been receiving increasing attention (Román *et al.*, 2023; Wu *et al.*, 2020), and certainly, two of the most affected sectors are tourism and hospitality given that their performance is strongly related to the shared experiences (via online reviews) before, during, and after the travel takes place (Buhalis *et al.*, 2023).

The usage of blockchain-based technologies to curb the impact of fake reviews has been mentioned earlier. Martens and Maalej (2018) conceptually proposed that the blockchain ecosystem provides a credible and trustworthy environment for the generation of WOM, and recently Bulchand-Gidumal and Melián-González (2023) followed up with further development of the model. Essentially, the model implies that all transactions are included in the blockchain and entail some information about the consumer/customer (frequency of shopping, reputation, etc.). Still, one of the issues that these two propositions do not address is the Metaverse implications and more sensory nature of WOM in the Metaverse, as well the WOM generators and seeker's perspectives. Fundamentally, the model only considers online reviews (only a single typology of eWOM) and does not specify the blockchain-based tokens that may be suitable in such immersive and fluid environments.

Figure 2 Conceptualization of NTT’s role in WOM ecosystem – a) WOM generator’s perspective; b) WOM seeker’s perspective (Source: based on Bulchand-Gidumal and Melián-González (2023) and Martens and Maalej (2018))



By providing a secure and verifiable means of tracking the authenticity (Yilmaz *et al.*, 2023) of shared experiences, NTT has the potential to help curb the impact of fake WOM – consequently inducing higher perceived credibility and helpfulness of WOM. Overall, NTT provides a suitable technological ambiance given the following features:

1. **Tamper-proof records** - NTTs can be used to create a tamper-proof record of WOM in Metaverse as it provides a secure and decentralized way of tracking and storing information, making it nearly impossible to alter, delete, and manipulate with WOM.
2. **Verifiable ownership** - by relying on NTTs to store WOM, it is possible to track the ownership of a specific WOM message and verify its genuineness and credibility. In the Metaverse, NTTs represent unique digital assets, such as virtual real estate, in-game items, or WOM messages, and their ownership can be easily tracked and verified on the blockchain. NTTs can encourage greater engagement with the Metaverse itself and increase the likelihood of WOM being retrieved and further generated.
3. **Incentivizing legitimate WOM** – hypothetically, NTTs can incentivize authentic and content-reach WOM by providing a reward or recognition for genuine opinions (e.g., digital badges, certificates, etc.). For example, NTTs can be used as rewards for participating in WOM campaigns or as recognition for contributing valuable content.
4. **Supporting trusted WOM ecosystem** - By creating a tamper-proof and decentralized structure, verifiable ownership, and attachment to virtual assets (e.g., WOM messages), NTT has the potential to contribute to the establishment of more credible, creative, and persuasive WOM ecosystems.

Given that the risk of multiple identities in Metaverse is a serious issue, one viable technological solution to curb this access-management-related issue may be self-sovereign identity (SSI). As users use authentication credentials stored in their wallets, they can access different platforms, services, and organizations (Ghirmai *et al.*, 2023). By providing users with a management platform for their data (Ferdous *et al.*, 2019), SSI may be a viable solution to authentication-related issues (e.g., multiple identities, false identities, etc.). In combination with

NTT, it can ensure that Metaverse enhances the credibility, engagement, and incentives associated with WOM, making it more persuasive and effective in driving engagement in the Metaverse-like worlds (e.g., purchases, visits, booking). As we incorporated the Metaverse component and NTT, the upgraded model follows up on recent calls to develop a more truthful rating system (Önder and Treiblmaier, 2018; Wu *et al.*, 2020).

6. Discussion

6.1 Conclusions

As the Metaverse presents a broader communication paradigm shift (Tan *et al.*, 2023), precisely defining WOM in this novel environment is crucial. Namely, the Metaverse-induced WOM theoretically should amplify the persuasiveness of messages, provide instant and dynamic information exchange, lay foundations for more engaging interactions, and eventually lead to new monetization models among influencers/avatars. Hereby the concept of sensory WOM is introduced (based on the immersiveness, fidelity, and sociability), which can create additional value for all involved stakeholders (e.g., hotels, marketers, and tourists). Consequently, an attempt has been made to map out the persuasiveness of metaWOM in virtual environments. By incorporating NTT, the Reviewchain model is upgraded to provide a transparent, safe, and trusted review ecosystem.

6.2 Theoretical implications

The present study relies on Macinnis (2011)'s three-phase approach to conceptualize WOM in Metaverse-like environments. We hereby emphasize three major contributions. Firstly, and most notably, we developed the metaWOM concept. Although in its essence is very similar to WOM and eWOM, the paradigm shift is evident. Namely, the interactive environment induces

increased levels of fidelity and engagement with the Metaverse (Mogaji *et al.*, 2023), which should lead to more sensory-enhanced experiences and more pronounced sensory features of WOM. Secondly, by applying media richness theory in a new context and incorporating crucial dimensions of full-scale Metaverse experience (immersiveness, sociability, fidelity), we presented various possible experiences in low and high conditions. Anchored in this theoretical stance, we were then able to hypothesize the persuasiveness of metaWOM in different conditions (Figure 2) and possibly forecast the effectiveness of metaWOM in various Metaverse-like environments. Lastly, we upgraded the originally developed model by Bulchand-Gidumal and Melián-González (2023) and Martens and Maalej (2018) to respond to the vocal scientific urge to produce a reliable review system (Önder and Treiblmaier, 2018; Wu *et al.*, 2020). In conclusion, given the ever-growing interest in Metaverse-like environments, a spike in companies and avatars populating Metaverses, and the growing specter of opportunities and challenges related to communication and metaWOM – we recognize an important emerging research stream.

6.3 Practical implications

The Metaverse's immersive experience and interactions provide unique and novel opportunities for companies to engage with their customers (Dwivedi *et al.*, 2023b; Golf-Papez *et al.*, 2022). Through metaWOM, companies can generate buzz and excitement around these experiences. Additionally, immersive features paired together with the perceived credibility of metaWOM will aid customers in their decision-making and buying process, especially in high-involvement purchases (e.g., booking a holiday). High-fidelity and immersiveness will allow potential customers to experience and evaluate different venues (e.g. hotels, restaurants) before making decisions.

As metaWOM provides ample opportunities for companies to create awareness, loyalty, brand advocacy, positive attitude, and increase sales, they need to be aware of the potential risks associated with metaWOM, including the spread of harmful, misleading, and unethical content. As metaWOM can be more persuasive, engaging, and memorable in comparison with other forms of WOM, it can have a significant impact on a company's reputation. Thus, companies need to monitor metaWOM communications and develop appropriate and timely response strategies to manage metaWOM. Additionally, it will be beneficial for companies to analyze metaWOM content to identify emerging trends, get insights into their audience behavior, and inform their marketing and product/service development strategies. As the Metaverse evolves and becomes more integrated into our daily lives and physical worlds (Dwivedi *et al.*, 2022), companies will need to consider the interplay between metaWOM and other forms of WOM communications. This will involve the development of holistic strategies to manage reputation and brand image across multiple channels.

6.4 Future research directions

While metaWOM could provide many ways to enhance consumer experience and bring benefits for companies, it can also present some challenges, such as perceived risks for consumers to engage in metaWOM communications, information overload, and underdevelopment of recent policies and regulations, to name a few. These would be important areas for future research to consider. The novel attributes of the Metaverse, such as interactivity and the use of avatars as a proxy between users and the Metaverse affect the way people can build and maintain their relationships. Therefore, it is important to investigate how

immersiveness, fidelity and sociability affect relationships in the Metaverse and how they affect the persuasiveness of metaWOM.

Researchers have found that different formats of eWOM communications affect consumer behavior (Filiberti *et al.*, 2021). As the Metaverse environment provides new dimensions for communications, future studies need to investigate new formats of metaWOM and its effect on consumer behavior. Which are the dominant demographic segments in Metaverse (income, age, lifestyle, education, etc.)? Are factors that affect WOM can be applied in the context of metaWOM? What role do additional dimensions (immersiveness, fidelity, and sociability) play in consumer buying behavior?

Additionally, future research is advised to look at motivations to create and share metaWOM. Current research has identified a number of motivations applied to other forms of WOM, such as altruism, satisfaction, and economic incentives, to name a few (Ismagilova *et al.*, 2021). Will the same motivations apply to metaWOM, or will other motivations emerge? What would be the implications for the producer and receiver of metaWOM communications?

Notably, the Metaverse should not be considered in isolation from the physical world consumers are living in. The connection between metaWOM and real-world buying behavior, and communications of real-world WOM and its impact on buying behavior in the Metaverse-like world(s) should be investigated: What is the spillover effect of WOM and eWOM on metaWOM? In addition, it is important to consider intermediaries involved in the travel scarce (e.g., travel agencies) (Buhalis *et al.*, 2023). How will metaWOM affect the role of intermediaries (e.g., Online travel agencies) in the travel decision-making process?

The usefulness of WOM communications is an important topic in marketing research as it affects information adoption and consumer buying behavior (Filiari *et al.*, 2018a). Currently, eWOM communications use various indicators to mark its usefulness (e.g., was this review useful for you, ratings). Future studies should investigate and develop relevant indicators for metaWOM usefulness.

As AI tools are getting more popular to make daily activities/tasks easier, future research can investigate the use of AI tools in creating metaWOM and its perceived usefulness. Another type of research can focus on monitoring metaWOM communications. Like other forms of WOM companies need to monitor metaWOM communications and develop strategies to deal with positive/negative communications. Additionally, ways to use AI tools to complete this task should be considered.

For the technology to be fully functional and usable, it is crucial to have legitimate support and legislation from the government (Buhalis *et al.*, 2023). Thus, future studies should address the following questions: What policies and regulations should be developed for metaWOM? What are the implications on jurisdictions and current/future legal frameworks?

Finally, for the success of metaWOM users should create enough content. To do it, consumers need to adopt and use VR sets or similar technology, which is critical for the full immersive experience. As a result, it is necessary to investigate factors that contribute to/hinder the widespread adoption of VR technology. Future research should look into this issue.

Table II summarizes many key research directions on metaWOM communications, which will enhance the knowledge of Metaverse and particularly metaWOM.

Table II Future research directions (Source: Authors)

Research directions	Research questions
Social Relationships in Metaverse	<p>How immersiveness, fidelity, and sociability affect relationship nature and building?</p> <p>How do these relationships affect the persuasiveness of metaWOM?</p> <p>What is the role of avatars as a proxy between users and Metaverse and how does it affect the persuasiveness of metaWOM?</p>
Formats of metaWOM	<p>What formats will metaWOM have?</p> <p>How do different formats affect consumer decision-making?</p> <p>What are the the most influential factors for different metaWOM formats?</p>
Information overload	<p>How do sensory communications affect the persuasiveness of metaWOM?</p> <p>How can sensory overload be avoided?</p> <p>How does an immersive environment affect information overload?</p>
Impact on Buying Behaviour	<p>What are the dominant demographic segments in the Metaverse (income, age, lifestyle, education, etc.)?</p> <p>How does metaWOM influence purchasing decisions in the Metaverse and in the physical world?</p> <p>What factors will affect the effectiveness of metaWOM communications?</p> <p>How immersiveness, fidelity, and sociability of metaWOM affect purchase behavior?</p>
Meta and real-world behavior	<p>How does metaWOM impact real-world buying behavior?</p> <p>How real-world WOM communications influence purchasing decisions in the virtual world.</p> <p>What is the spillover effect of WOM and eWOM on metaWOM?</p> <p>How will metaWOM affect online travel agencies and their role in the decision-making process?</p>
Usefulness of metaWOM	<p>What indicators will be used to mark metaWOM as useful for other users?</p> <p>Can indicators from eWOM communications (ratings) be used?</p>
Use of AI	<p>How can users apply AI tools to help them create metaWOM?</p>
Technology adoption	<p>Will these kinds of communications perceive as useful?</p> <p>What factors can contribute to/hinder the mass adoption of VR technology?</p>
Motivations to create and share metaWOM	<p>What motivations will users have when creating and sharing metaWOM?</p> <p>Will they be similar to eWOM communications?</p>

	How can companies encourage/motivate users to create and share metaWOM?
Monitoring of metaWOM	How can companies monitor metaWOM communications? What are the response strategies to deal with negative/positive metaWOM? How can AI be used to monitor and analyze metaWOM?
Effectiveness of metaWOM strategies	What strategies are appropriate for various types of products/services? What are the best practices?
Risks	What preventive measures will ensure the authentication of users in Metaverse? How the issue of multiple identities will be enforced on a broad scale? What are the perceived risks for users to engage in metaWOM communications? How can cyberbullying affect consumers' motivations to engage in metaWOM?
Policy and regulations	What policies and regulations should be developed to regulate metaWOM? What are the implications on jurisdictions and current/future legal frameworks?

6.5 Limitations

The current article has some limitations. First, for the sensory metaWOM to emerge and be used, widespread adoption and acceptance of VR devices and Metaverse are required. The current study is based on the assumption of mass adoption of VR devices, which is the fundamental condition for metaWOM to develop and spread. Second, this study used NTT as a means to tackle the credibility crisis of eWOM communications. Some might argue that the NTT domain is still in its infancy and adoption rates and trends are questionable now. However, there is a consensus in the literature that NTT is considered a viable solution to curb the issues around mistrust, authentication, and privacy (Belk *et al.*, 2022; Yilmaz *et al.*, 2023).

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