Chapter 17
Smart Extended Reality in the Metaverse-Tailing: The Rise of New Retail Landscape

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Abstract This chapter aims to investigate the rise of Metaverse by considering the merge of interactive technologies (such as augmented and virtual reality and artificial intelligence) into a new retail landscape. The research flow of this chapter is guided by three theories able to identify and clarify how a smart Extended Reality in the Metaverse-Tailing can be considered as the rise of new retail environment. First, the affordance theory of technology will help to understand the possibility of obtaining value from specific technology, deriving from the Metaverse world. Secondly, the lens of regulatory engagement theory is helpful to understand the positive engagement of people during their experience in a specific object or environment thanks to the exploitation of augmented and virtual reality in a Metaverse world. In line with the regulatory engagement theory, this chapter aims to underline the possible way of involvement in the Metaverse during a shopping journey and exploiting potentialities deriving from Augmented Reality, Virtual Reality and Artificial Intelligence, such as interaction, immersion, inspiration and satisfaction. Finally, the self-determination theory identifies the possible intrinsic or extrinsic motivation that leads people to experience retailing in the metaverse-tailing as a fusion of several advanced technologies.

17.1 Introduction

In the last few years, the emergent technologies (Grewal et al. 2021, 2020a) that are modifying retail settings are imposing profound reflections on how it is possible to

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adapt to these changes. Particularly, on one side, retailers and practitioners need to re-think their strategies (Grewal et al. 2021, 2020b) to adapt to these technologies and exploit them in the best possible way to face the rise of new retail settings such as the Metaverse. On the other side, consumers are constantly involved in new shopping experiences considering several external factors. For example, the rapid spread of COVID-19 modified the way of shopping and accelerated the adoption of technologies such as augmented and virtual reality (Caboni and Pizzichini 2022) and artificial intelligence in general. The development of always new desires and needs pushes people to explore interactive technologies' potentiality, and consequently, the shopping experience continues in evolution, adapting to the continual reshaping of retail. In this chapter, the approach to the Metaverse considers several interactive technologies such as the Internet, social media, mobile technologies, augmented reality (AR), and virtual reality (VR). In this regard, people can have practical access to information and consumption channels (Shankar et al. 2021) anywhere any time, increasing their endless shopping experience. Finally, thanks to the exploitation of interactive technologies, it is simple to imagine how the shopping experience assumes a new dimension where people can engage in virtually seamless connections with retailers, manufacturers, consumers, and influencers (Dolbec and Fischer 2015; Grewal et al. 2017). People in the realm of emergent, intelligent and interactive technologies (Grewal et al. 2021, 2020a) have at their disposal the possibility to share not only shopping information with others but also decisions and evaluations on products and services, creating huge shopping community both physically and virtually. In this scenario appears fundamental to consider the new and modified ways of shopping often accelerated by the adoption of technologies such as augmented and virtual reality and artificial intelligence in general. In this venue people can explore interactive technologies' potentiality and adapting to the continual reshaping of retail. In this dynamic context, this chapter approaches the rise of Metaverse by considering the fusion of interactive technologies such as augmented and virtual reality and artificial intelligence into a new retail landscape. The research flow of this chapter is guided by three theories (Fig. 17.1) able to identify and clarify how a smart Extended Reality in the Metaverse-Tailing can be considered as the rise of new retail landscape. In particular, this chapter aims to answer to the following research questions:

RQ1: How it is possible to obtain value from the Metaverse?
RQ2: How to stimulate a positive engagement in the Metaverse?
RQ3: What intrinsic or extrinsic motivation, may lead people in the Metaverse experience?

To answer to the above-mentioned questions, this chapter will consider the affordance theory of technology (Gaver 1991), the regulatory engagement theory (Higgins and Scholer 2009), and finally the self-determination theory (Deci and Ryan 1980; 1985a; 1985b; 1987; 2000, 2012). Specifically, the affordance theory of technology (Gaver 1991) will help to understand the possibility of obtaining value from specific

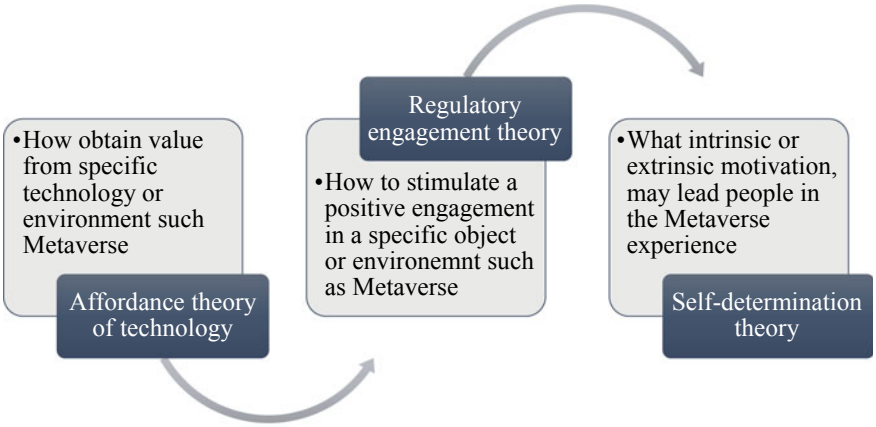

Fig. 17.1 Research flow

technology, deriving from the Metaverse world. Then, the lens of regulatory engagement theory (Higgins and Scholer 2009) is helpful to understand the positive engagement of people during their experience in a specific object or environment thanks to the exploitation of augmented and virtual reality and artificial intelligence, in a Metaverse world. In line with the regulatory engagement theory (Higgins and Scholer 2009), this chapter aims to underline the possible way of involvement in the Metaverse during a shopping journey and exploiting potentialities deriving from the fusion of augmented, virtual reality and artificial intelligence, such as interaction, immersion, inspiration and satisfaction. Finally, the self-determination theory (Deci and Ryan 1980; 1985a; 1985b; 1987; 2000, 2012) identifies the possible intrinsic or extrinsic motivation that led people to experience retailing in the Metaverse-tailing as a fusion of several advanced technologies.

17.2 Theoretical Background

To approach the rise of a new retail landscape such as the Metaverse-tailing, consider the merge of interactive technologies such as augmented and virtual reality and artificial intelligence into a new retail landscape. Notably, the section below will be presented a general description of the Metaverse by following the three theories used in this chapter to understand more deeply the smart extended reality in the Metaverse-tailing.

17.2.1 Smart Extended Reality in the Metaverse-Tailing

Identifying a smart extended reality appears particularly innovative and interesting, considering the rapid and new development of what scholars contemplating as the Metaverse. The term Metaverse was coined 30 years ago when Neal Stephenson, in his fiction novel called "Snow Crash" used the word Metaverse (Papagiannidis et al. 2008; Wright et al. 2008; Marmaridis and Griffith 2009; Sourin 2017; Murray 2020; Key et al. 2021; Park and Kim 2022), and several definitions in the course of time has been developed (see Table 17.1). More specifically, this term was used to identify a place based on one principal feature: the co-presence of real and virtual elements (Joeng 2022). Basically, from the analysis of this term derive two subordinate words: one prefix as "Meta" with the meaning of beyond and a suffix "verse" that refers to the universe (Marmaridis and Griffith 2009; Lee et al. 2011; Dionisio 2013; Fang et al. 2021; Jeon 2021; Kye et al. 2021; Jeong 2022). So literally, a meta world could be considered in this chapter as a smart world because it is composed of smart elements such as interactive and intelligent technologies and innovative services.

Specifically, the academic literature until this moment categorized the Metaverse as a place composed of interactive technologies such as Augmented reality, Mirror worlds, and Virtual worlds (Park and Kim 2022; Nevelsteen 2018; Lee et al. 2011). The value of this world rises drastically with the younger generation, such as generation Z that has a considerable attitude toward using intelligent technologies (Park and Kim 2022). At this moment, the academic literature with a specific reference to business and management still needs to be developed, and there is a paucity of studies able to identify how this meta-world is developing. However, the 2021 can be considered a milestone because Facebook (now called Meta) started to invest several amounts of money in developing its Metaverse strategy (Binson 2021; Rauschnabel et al. 2022; Rospigliosi 2022; Wiederhold 2022). This example allows us to glimpse how, in the coming years, the Metaverse will constitute a great source of economic, commercial and social value (Papagiannidis 2008; Daz et al. 2020; Park and Kim 2022) for different categories of people and companies that will be present in the Metaverse. In fact, after Facebook's investment on the Metaverse (Binson 2021; Rauschnabel et al. 2022; Rospigliosi 2022; Wiederhold 2022), people started to express their interest in this murky world. Moreover, it might be desirable to think that shortly a smart extended reality will be the first-place where people will go to experience immersive experiences (Papagiannidis 2008). Notably, thanks to the support of intelligent and smart technologies, people can socialize and interact (Wright et al. 2008) in a parallel world such as the Metaverse. Since the rise of the words Metaverse, scholars have developed several attempts to define and analyse the different features of this technology. Scholars refer to this world as a combination of virtual objects in a natural environment (Lee et al. 2011; Davis et al. 2009; Gadalla 2013; Jeong 2022). And as a virtual world where people can interact in real-time with others thanks to the support of an avatar (Leenes 2008; Davis et al. 2009; Owens et al. 2011; Gadalla 2013; Daz et al. 2020; Laviola et al. 2022; Wiederhold 2022). All in all, the main characteristics of the Metaverse can be identified in the following points (summarised in Fig. 17.2):

Table 17.1 Principal Metaverse definitions

Authors and year	Definitions
Stephenson 1992	A word where humans as avatars can interact with others in a 3 dimensions space that reflect a physical world
Jaynes et al. 2003	An immersive environment with digital media network able to remove the barriers of time and space
Rymaszewski et al. 2007	An environment where people are able to create their personality, visit different places, explore expansive buildings and shop
Collins 2008	An interactive network with continuous, immersive 3D virtual environment accessible
Wright et al. 2008	Extensive 3D virtual world able to support people for social interaction
Schlemmer et al. 2009	Extension of physical world within the virtual internet
Schaf et al. 2009	A world of enhancing the feeling of being in a classroom
Messinger et al. 2009	A virtual world where thousands of people can interact simultaneously within the same 3D environment
Cunningham 2010	A compound word of meta and universe where the real and virtual world are mixed
Owens et al. 2011	An immersive 3D virtual world where people interact each-others by using real worlds metaphors but without physical limitations
Toneis 2011	A world that reconstructs the meaning of the living world with experience
Guo et al. 2011	A computer simulation that allow avatars to interconnect and communicate in relatively life-like environments
Kim et al. 2013	A collective online space created by combining physical reality enhanced by a 3Dvirtual world and a physical permanent virtual space
Luse et al. 2013	A virtual world that allow people to live their virtual life online
Dionisio et al. 2013	An integrated network of 3D virtual worlds in an independent virtual world or an attractive realm for human sociocultural interaction
Papagiannidis et al. 2014	A place where users are able to create content and object they want
Preda et al.	Collective online shared environment
Ko and Jang 2014	An online virtual community that allow people to interact each-others through avatars
Dascalu et al. 2014	New environment where physical and digital objects co-exist
Amorim et al. 2014	An immersive environment that can simulate real world features
Chen 2016	AN immersive environment that reflect the real world co-created by users
Choi and Kim 2017	A space created by the fusion of virtual and augmented reality
Huggett 2020	A world where virtual worlds combine immersive VR with physical actors, objects, interfaces and networks in a future form of the Internet

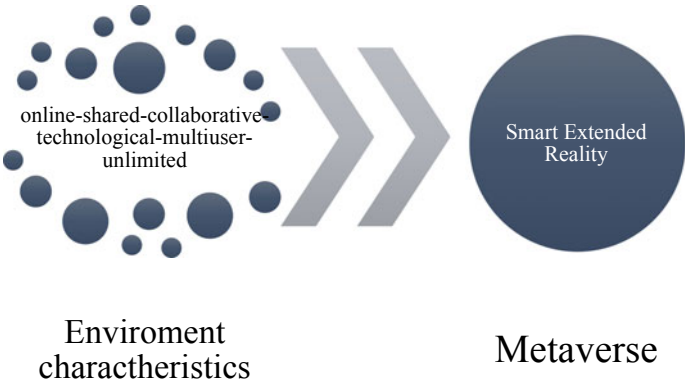

Fig. 17.2 Smart extended reality

(1) A collaborative environment (Kumar et al. 2008; Wright et al. 2008; Gadalla 2013) because people collaborate to achieve several different goals such as economic, social and leisure (Kumar et al. 2008).
(2) An online place because people are immersed in an online environment based on three dimensions (Papagiannidis 2008; Marmaridis and Griffith 2009; Owens et al. 2011; Gadalla 2013; Kawaguchi et al. 2020; Binson 2021).
(3) A shared world (Kim 2021) because people have the possibility to share their activities, opinion, and information (Binson 2021; Davis et al. 2009; Papagiannidis 2008) and the shopping becomes a networked experience (Pantano and Gandini 2018).
(4) An augmented and technological place (Huggett, 2020) because people thanks to the support of augmented reality have the possibility to augment their experience (Caboni and Hagberg 2019; Caboni and Pizzichini 2022), and also socialize and interact (Wright et al. 2008) thanks to the support of virtual elements, technologies and the Internet (Han et al. 2010a, b).
(5) A multiuser environment (Daz et al. 2020) because people can use the same technologies or conduct the same activities at the same time, as an extension of their real life (Kuam et al. 2008).
(6) An unlimited world because the Metaverse could be the reproduction a physical world but without any physical limitations (Marmaridis and Griffith 2009; Papagiannidis 2008; Daz et al. 2020; Kawaguchi et al. 2020; Leenes 2008).

17.3 Affordance Theory of Technology

The term affordance introduced by Gibson in 1977, refers to the invitation to use an object that through its physical quality suggests people how to use it. Specifically, Gibson (1977; 1979) explained how animals, without resorting to any kind of reasoning, were able to grasp the intrinsic meaning of an object using simply sensory

perception. Hence, the concept of affordance refers to the perception, originated by the senses, that a user has of the relationship that is established between him and an object within an environment. After Gibson (1977; 1979), Norman (1988; 1999), highlighted another point of view by studying the perceptions that an object transmits to an actor and from which it is possible to define a product architecture that is intuitive and usable. According to these two principal concepts related the affordance and extending those in the Metaverse environment, the affordances deriving from the Metaverse are related to a user relationship with the Metaverse environment obtaining specific value from the exploitation of technologies in this world. In this context, the application of the concept of affordance to the technology comes from Gaver (1991) that stated that affordances are properties of the world that pay off possible some action to an organism to act in specific ways. Hence, the affordance theory of technology (Gaver 1991) appears useful to understand how it is possible to obtain value from the use of technology and more specifically from the Metaverse environment considered as a melting pot of several technologies such as augmented reality, virtual reality and internet of thing, or artificial intelligence more in general. In particular, as expressed by Gaver (1991) the affordance theory of technology refers to using a specific technology under specific environmental circumstances to address particular goals.

In the Metaverse environment, it is possible to identify specific conditions and circumstances from which people can obtain value (Gibson 2014) and satisfying their needs and desires. As this world is online, shared, unlimited, collaborative, technological and multiuser environment, people can satisfy their needs for an immersive experience and obtain value (Gibson 2014) from the interactive technologies (Pantano 2016; Pantano and Gandini 2017). In particular a world described as a smart extended reality could be characterized by several stimuli deriving from the use of immersive and interactive technologies (Pantano 2016) that are able to influence the consumers behaviour's (Pantano and Gandini 2017). In this regard the affordance theory of technology (Gaver 1991) applied to the Metaverse make it possible to consider this place as a plethora of technologies (Augmented, Virtual, Artificial) with different affordances that permit people to make possible their actions as in a normal life. In fact, according to the affordance theory, the focus to understand how to get a value from the Metaverse should be not properly on the technologies but on the fundamental interactions between users, context, environment and technologies (Fig. 17.3). In accord to the affordance theory of technology (Gaver 1991) the value from the Metaverse derives from the connection of the elements composing the Metaverse such as users (real and avatars), the context (technological and digital) where people take place their actions, and the environment (shared, collaborative, multiuser, unlimited) where they conduct their experience.

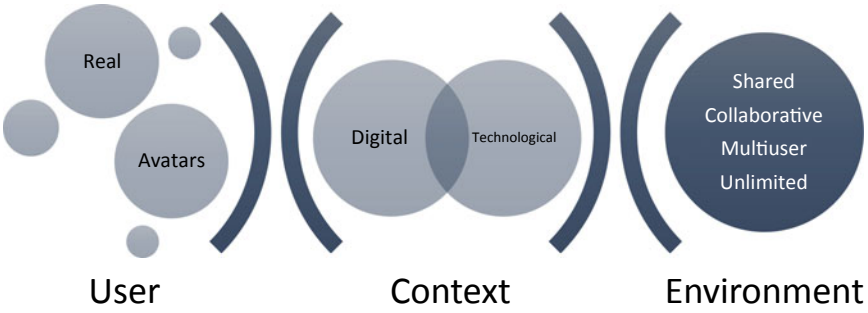

Fig. 17.3 The affordance theory in the Metaverse

17.4 Regulatory Engagement Theory

The engagement is another element that people (firms and practitioners more in general) involved in the creation and exploitation of a Metaverse need to take into consideration to create as much as possible an immerse experience (Pantano 2016; Pantano and Gandini 2017) for users. Particularly, considering the regulatory engagement theory (RET) the psychological state of a person related to the engagement (Higgins 2006; Higgins and Scholer 2009), is referred the attention stimulated by an attractive or repulsive motivational factors. In fact, a positive engagement (such in the Metaverse environment) is able to induces and attractive experience and on the contrary if the experience has a negative value people are prompt to reject the experience (Kuvykaite and Tarute 2015). More in depth, this theory appears useful to discern the motivational factors (strong or weak) that lead in their experience and the directions they take, towards or away (Higgins and Scholer 2009). In this way it is possible to predict the consumers behaviour in a new environment and understand the process followed by user in co creation of value (Scholer and Higgins 2009) in the Metaverse. Accordingly, to the regulatory engagement theory (Higgins 2006; Higgins and Scholer 2009) a positive engagement of an object, such as the Metaverse, can produce an engaging experience (Arghashi and Yuksel 2022). A strong engagement (Higgins and Scholer 2009), deriving from the immersion in the Metaverse world by using different kind of smart technologies (Augmented, virtual, artificial intelligence), can increase the positive consumer experience in this smart extended reality. In line with RET, the different ways of engagement (Fig. 17.4) in the Metaverse immersion (Yim et al. 2017) are related to the interaction (Nikhashemi et al. 2021), inspiration (Rauschnabel et al. 2019) and satisfaction (Hinsch et al. 2020) of the needs of touch and haptic imagery.

In line with the regulatory engagement theory (Higgins 2006; Higgins and Scholer 2009), the level of engagement in this smart extended reality could derive from level of interaction with other users and smart technologies; the inspiration deriving from the environment able to involve user in acting as in normal life; and finally, from the satisfactions of their needs in a Meta-word such as in the physical word.

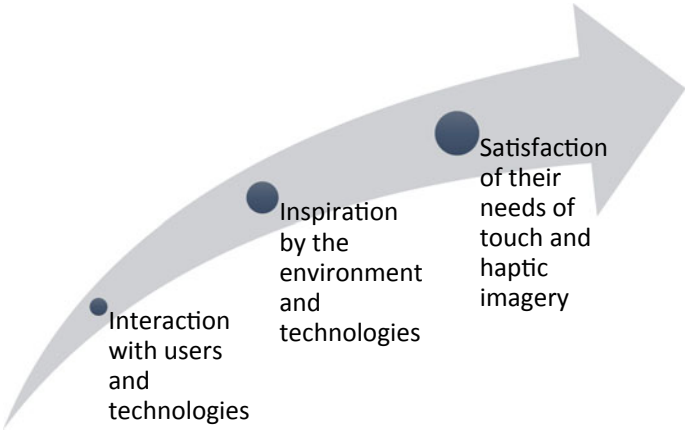

Fig. 17.4 Engagement in the Metaverse

In the Metaverse experience the user experience with the technologies affecting this smart extended reality has a central role on the decision to use the Metaverse to conduct everyday activities as in an everyday life. In this regard, and in line with the regulatory engagement theory, the analysis highlights that the consumer engagement is the principal force able to motivate the Metaverse experience.

17.5 Self-Determination Theory

The self-determination theory (Deci and Ryan 1980; 1985a, b; 1987, 2000, 2012) is based on three principal pillars: autonomy, competence and relatedness. This theory can explain how is essential the need for autonomy for a person in order to self-organize its own life (Deci and Ryan 1985a, 1987). Consequently, the need for competence refers to the ability to be or become effective in each action/interaction with the environment where a person is immersed (Deci and Ryan 1980, 1985a). The need for relatedness (Baumeister and Leary 1995), attend to the necessity to have a feeling connection with other people able to support each action in everyday life. In this regard, the self-determination theory (Deci and Ryan 1980; 1985a, b; 1987, 2000, 2012) could be an excellent support to understanding the principal psychological needs in new smart reality such as Metaverse. People can conduct their everyday activities in a new environment (Metaverse) with new features and characteristics by using technology at their disposal. However, according to this theory, each action is finalized to achieve the need for autonomy, competence and relatedness. People need to self-determine their life (Deci and Ryan 1985a, 1987) to feel control over their choices. For this reason, they need to understand how a smart extended reality could work by discovering its features and potentialities. According to the self-determination theory, people are constantly motivated to grow

and acquire new competence skills to satisfy their three psychological needs (Deci and Ryan 2000; 2012). In this context, the Metaverse could be a smart extended reality where people can also satisfy their needs when they cannot conduct the same activities in the physical world.

In fact, in the Metaverse world, people can satisfy their competence needs by learning what they want in digital reality, where they can find several solutions to satisfy this primary need. Then, as the Metaverse is a place enriched by several interactive technologies, people can stay connected with others (relatedness), and preserve their social activity in an unlimited way, thanks to the potentiality of a Metaverse. The self-determination theory (Deci and Ryan 2000; 2012) focuses principally on internal motivation to do something such as the need to gain knowledge or independence (intrinsic motivation), so the Metaverse environment allows people to satisfy their need for autonomy and competence in a smart extended reality. Then, as expressed by self-determination theory (Deci and Ryan 2000; 2012) people need to experience a sense of belonging and attachment to other people, and the Metaverse permits people to achieve a sense of belonging to a community (Baumeister and Leary 1995) by exploiting the potentiality of this world.

To summed up the contribution of the self-determination theory (Deci and Ryan 1980; 1985a, b; 1987, 2000, 2012) to a smart extend reality such as a Metaverse (Fig. 17.5), it is possible to highlight that this environment appears rich of potentiality to satisfy the three basic psychological needs of people. In particular, the Metaverse is a smart environment where people can have at their disposal different way to get new knowledge to satisfy their need of competence. In the Metaverse environment people are also needed to conduct several kind of activities able to support their need of autonomy. And finally, the Metaverse is a place where people can have strong relationships with others, and easily satisfy their need of belonging.

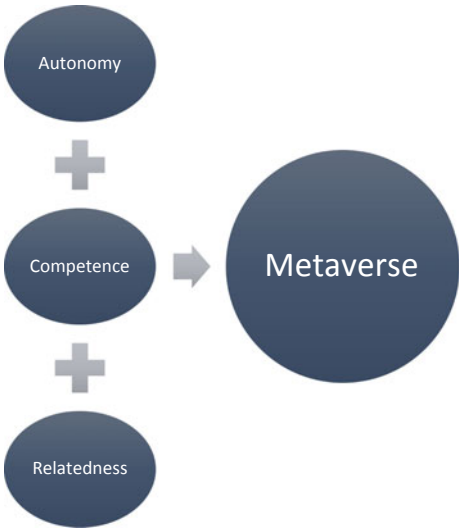

Fig. 17.5 Three psychological needs in the Metaverse

17.6 Discussion and Conclusion

To identify a punctual definition of a smart extended reality such as the Metaverse appear difficult for the paucity of the study in marketing and management able to emphasis the characteristics and benefits and outcomes of this new and not well-defined environment. This chapter aimed to focus the attention on some theories useful and helpful for researcher and practitioners to understand how and from what specific point of view it is possible to understand this new world. More specifically (as represented in Fig. 17.1) the three theories described in this chapter, the affordance theory of technology (Gaver 1991), the regulatory engagement theory (Higgins and Scholer 2009), and the self-determination theory (Deci and Ryan 1980; 1985a; 1985b; 1987; 2000, 2012) could be a valid support to answer how conceptualize a new smart extended reality that is still under investigated. In fact, thanks to the support of the affordance theory of technology (Gaver 1991) this chapter explained how it is possible to get value from specific technology, deriving from the Metaverse world. According to this theory the value from the Metaverse derives from the connection of the elements composing it such as users (real and avatars), the context (technological and digital) where people take place their actions, and the environment (shared, collaborative, multiuser, unlimited) where they conduct their experience.

Then, from the regulatory engagement theory (Higgins and Scholer 2009), this chapter identified how a positive engagement of people during their experience in a specific object or environment could derive from the exploitation of augmented and virtual reality and artificial intelligence, in a Metaverse world. Therefore, in line with the regulatory engagement theory (Higgins and Scholer 2009), this chapter underlined the possible way of involvement in the Metaverse during a shopping journey and exploiting potentialities deriving from the merge of augmented, virtual reality and artificial intelligence, such as interaction, immersion, inspiration and satisfaction. In fact, the level of engagement in a smart extended reality could derive from level of interaction with other users and smart technologies; the inspiration deriving from the environment able to involve user to conduct their actions and regular activities as in normal life; and finally, from the satisfactions of their needs in a Meta-word such as in the physical word.

Finally, the self-determination theory (Deci and Ryan 1980; 1985a; 1985b; 1987; 2000, 2012) identified the intrinsic motivation that led people to experience retailing in the Metaverse-tailing as a fusion of several advanced technologies. According to the self-determination theory (Deci and Ryan 1980; 1985a, b; 1987, 2000, 2012) a smart extend reality (such as the Metaverse) seems to be an environment with high potentiality able to satisfy the three basic psychological needs of people. In particular, the Metaverse appears a smart environment where people can have at their disposal different way to get new knowledge to satisfy their need of competence, and where they can do different activities to satisfy their need of autonomy, and they can also have strong relationship with others, and satisfy easily their need of belonging.

References

Amorim T, Tapparo L, Marranghello N, Silva ARC, Pereira AS (2014) A multiple intelligences theory-based 3D virtual lab environment for digital systems teaching. Proc Comput Sci (29):1413–1422

Arghashi V, Yuksel CA (2022) Interactivity, inspiration, and perceived usefulness! How retailers' AR-apps improve consumer engagement through flow. J Retail Consum Serv 64:102756

Baumeister R, Leary MR (1995) The need to belong: desire for interpersonal attachments as a fundamental human motivation. Psychol Bull 117:497–529

Binson B (2021) Editorial metaverse and crypto Art during the COVID-19 pandemic. J Urban Cult Res 23:1–2

Caboni F, Hagberg J (2019) Augmented reality in retailing: a review of features, applications and value. Int J Retail Distrib Manage 47(11):1125–1140

Caboni F, Pizzichini L (2022) How the COVID-19 pandemic may accelerate millennials' adoption of augmented reality. Int J Retail Distrib Manage 50(13):95–115

Chen JC (2016) The crossroads of English language learners, task-based instruction, and 3D multiuser virtual learning in second life. Comput Educ 102:152–171

Choi HS, Kim SH (2017) A content service deployment plan for metaverse museum exhibitions centering on the combination of beacons and HMDs. Int J Inf Manage 37(1):1519–1527

Collins C (2008) Looking to the future: higher education in the metaverse. Educause Rev 43(5):51–63

Cunningham TC (2010) Marching toward the metaverse; strategic communication through the new media. Army Command Gen Staff Coll Fort Leavenworth KS School Adv Mil Stud, VA, USA, Tech. Rep. ADA522953

Dascalu MI, Moldoveanu A, Shudayfat EA (2014) Mixed reality to support new learning paradigms. In: Proceeding 18th International Conference System Theory, Control Computer (ICSTCC), pp 692–697

Davis A, Murphy J, Owens D, Khazanchi D, Zigurs I (2009) Avatars, people, and virtual worlds: foundations for research in metaverses. J Assoc Inf Syst 10(2):90–117

Daz JEM, Salda CAM, Avila CAR (2020) Virtual world as a resource for hybrid education. Int J Emerg Technol Learn 15(15):94–109

Deci EL, Ryan RM (1980) The empirical exploration of intrinsic motivational processes. Adv Exp Soc Psychol 13:39–80

Deci EL, Ryan RM (1985a) Intrinsic motivation and self-determination in human behavior. Plenum Press, New York

Deci EL, Ryan RM (1985b) The general causality orientations scale: self-determination in personality. J Res Pers 19:109–134

Deci EL, Ryan RM (1987) The support of autonomy and the control of behavior. J Pers Soc Psychol 53:1024–1037

Deci EL, Ryan RM (2000) The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. Psychol Inq 11:227–268

Deci EL, Ryan, RM (2012) Self-determination theory. In: Van Lange PAM, Kruglanski W, Higgins ET (eds.), Handbook of theories of social psychology,Sage Publications Ltd., pp 416–436. https://doi.org/10.4135/9781446249215.n21

Dionisio JDN, Burns Iii WG, Gilbert R (2013) 3D virtual worlds and the metaverse: current status and future possibilities. ACM Comput Surv 45(39)

Dolbec YC, Fischer E (2015) Refashioning a field? connected consumers and institutional dynamics in markets. J Consum Res 41(6):1447–1468

Fang Z, Cai L, Wang G (2021) MetaHuman creator the starting point of the metaverse. In: Proceedings of international symposium on computer technology and information

Gadalla E, Keeling K, Abosag I (2013) Metaverse-retail service quality: a future framework for retail service quality in the 3D internet. J Mark Manag 29(13–14):1493–1517

Gaver WW (1991) Technology affordances. In: Proceedings of the SIGCHI conference on Human factors in computing systems, pp 79–84
Gibson JJ (1977) The theory of affordances. Hilldale, USA 1(2):67–82
Gibson JJ (1979) The ecological approach to visual perception. Houghton Mifflin, New York
Gibson JJ (2014) The theory of affordances (1979). In: The people, place, and space reader. Routledge, pp 90–94
Grewal D, Roggeveen AL, Nordf˙alt J (2017) The future of retailing. J Retail 93:1–6
Grewal D, Hulland J, Kopalle PK, Karahanna E (2020a) The future of technology and marketing: a multidisciplinary perspective. J Acad Mark Sci 48:1–8
Grewal D, Noble SM, Ahlbom C, Nordf˙alt J (2020b) The sales impact of using handheld scanners: evidence from the field. J Mark Res 57(3):527–547
Grewal D, Gauri DK, Das G, Agarwal J, Spence MT (2021) Retailing and emergent technologies. J Bus Res 134:198–202
Guo J, Angelina C, Rolf WT (2011) Virtual wealth protection through virtual money exchange. Electr Comm Res Appl 10(3):313–330
Han J, Yun J, Jang J, Park KR (2010) User-friendly home automation based on 3D virtual world, IEEE Trans Consum Electron 56(3)5606335: 1843–1847
Higgins ET (2006) Value from hedonic experience and engagement. Psychol Rev 113:439–460
Higgins ET, Scholer AA (2009) Engaging the consumer: the science and art of the value creation process. J Consum Psychol 19(2):100–114
Hinsch C, Felix R, Rauschnabel PA (2020) Nostalgia beats the wow-effect: inspiration, awe and meaningful associations in augmented reality marketing. J Retail Consum Serv 53:101987
Huggett J (2020) Virtually real or really virtual: towards a heritage metaverse? Studies Digit Heritage 4(1):1–15
Jaynes C, Seales WB, Calvert K, Fei Z, Grif J (2003) The metaverse: a networked collection of inexpensive, self-con guring, immersive environments. In Proceeding workshop virtual environment, pp 115–124
Jeon JE (2021) The effects of user experience-based design innovativeness on user–metaverse platform channel relationships in South Korea. J Distrib Sci 19(11):81–90
Jeong H, Yi Y, Kim D (2022) An innovative e-commerce platform incorporating metaverse to live commerce. Int J Innov Comput Inf Control 18(1):221–229
Kawaguchi M, Kobayashi T, Yoshitake M (2020) Virtual experiments in metaverse and their applications to collaborative projects: The framework and its significance. Proc Comput Sci (176):2125–2132
Kim J (2021) Advertising in the Metaverse: Research Agenda J Interact Advertising 21(3):141–144
Kim SK, Joo YS, Shin M, Han S, Han, JJ (2013) Virtual world control system using sensed information and adaptation engine. Signal Process, Image Commun 28(2):87–96
Ko E, Jang J (2014) The virtual device managing module of the metaverse assisted living support system. In: Proceedings international conference modeling, simulation visualization methods (MSV) steering committee world congress in computer, engineering and applied Computing, pp 125–126
Kumar S, Chhugani J, Kim C, Kim D, Nguyen A, Dubey P, Bienia C, Kim Y (2008) Second life and the new generation of virtual worlds. Computer 41(9):46–53
Kuvykaitė R, Tarutė A (2015) A critical analysis of consumer engagement dimensionality. Procedia Soc Behav Sci 213:654–658
Kye B, Han N, Kim E, Park Y, Jo S (2021) Educational applications of metaverse: possibilities and limitations. J Educat Eval Health Prof 18(A1)
Laviola E, Gattullo M, Manghisi VM, Fiorentino M, Uva AE (2022) Minimal AR: visual asset optimization for the authoring of augmented reality work instructions in manufacturing. Int J Adv Manuf Technol 119(3–4):1769–1784
Lee SE, Domina T, MacGillivray M (2011) Exploring consumers' flow experiences in virtual shopping: an exploratory study. Int J Electr Market Retail 4(2–3):165–182

Leenes R (2008) Privacy in the metaverse: regulating a complex social construct in a virtual world. IFIP Int Fed Inf Process 262:95–112
Luse A, Mennecke B, Triplett J (2013) The changing nature of user attitudes toward virtual world technology: a longitudinal study. Comput Hum Behav 29(3):1122–1132
Marmaridis I, Griffith S (2009) Metaverse services: extensible learning with mediated teleporting into 3D environments. In: Lecture notes in business information processing 20 LNBIP, pp 229–239
Messinger PR, Stroulia E, Lyons K, Bone M, Niu RH, Smirnov K, Perelgut S (2009) Virtual worlds past, present, and future: new directions in social computing. Decis Supp Syst 47(3):204–228
Murray JH (2020) Virtual/reality: how to tell the difference. J Vis Cult 19(1)
Nevelsteen KJL (2018) Virtual world, defined from a technological perspective and applied to video games, mixed reality, and the Metaverse. Comput Anim Virtual Worlds 29(1):e1752
Nikhashemi SR, Knight HH, Nusair K, Liat CB (2021) Augmented reality in smart retailing: A (n)(A) symmetric approach to continuous intention to use retail brands' mobile AR apps. J Retail Consum Serv 60:102464
Norman DA (1988) The Psychology of Everyday Things. Basic Books, New York
Norman DA (1999) Affordance, conventions, and design. interactions 6(3):38–43
Owens D, Mitchell A, Khazanchi D, Zigurs I (2011) An empirical investigation of virtual world projects and metaverse technology capabilities. ACM SIGMIS Database: Database Adv Inf Sys 42(1):74–101
Pantano E (2016) Engaging consumer through the storefront: evidences from integrating interactive technologies. J Retail Consum Serv 28:149–154
Pantano E, Gandini A (2017) Exploring the forms of sociality mediated by innovative technologies in retail settings. Comput Hum Behav 77:367–373
Pantano E, Gandini A (2018) Shopping as a "networked experience": an emerging framework in the retail industry. Int J Retail Distrib Manage 46(7):690–704
Papagiannidis S (2008) From 2D to 3D: making the transition from web to metaverse retailing. Cutter IT J 21(9):14–18
Papagiannidis S, See-To E, Bourlakis M (2014) Virtual test-driving: the impact of simulated products on purchase intention. J Retail Consum Serv 21(5):877–887
Park SM, Kim YG (2022) A metaverse: taxonomy, components, applications, and open challenges. IEEE Access 10:4209–4251
Rauschnabel PA, Felix R, Hinsch C (2019) Augmented reality marketing: How mobile AR-apps can improve brands through inspiration. J Retail Consum Serv 49:43–53
Rauschnabel PA, Babin BJ, tom Dieck MC, Krey N, Jung T (2022) What is augmented reality marketing? Its definition, complexity, and future. J Bus Res 142:1140–1150
Rospigliosi PA (2022) Metaverse or Simulacra? Roblox, minecraft, meta and the turn to virtual reality for education, socialisation and work. Interact Learn Environ 30(1):1–3
Rymaszewski M, Au WJ, Wallace M, Winters C, Ondrejka C, Batstone-Cunningham B (2007) Second Life: the official guide. Wiley, Hoboken, NJ, USA
Schaf FM, Müller D, Bruns FW, Pereira CE, Erbe HH (2009) Collaborative learning and engineering workspaces. Annu. Rev. Control 33(2):246 252
Schlemmer E, Trein TD, Cristoffer O (2009) The metaverse: telepresence in 3D avatar-driven digital-virtual worlds. Tic Revista D'innovaci Educativa 2(26):32
Shankar V, Kalyanam K, Setia P, Golmohammadi A, Tirunillai S, Douglass T, Waddoups R (2021) How technology is changing retail. J Retail 97(1):13–27
Sourin A (2017) Case study: shared virtual and augmented environments for creative applications. Springer Briefs Comput Sci 0(9783319540801): 49–64.
Stephenson N (1992) Snow crash; bantam books. New York, NY, USA
Tonéis CN (2011) Puzzles as a creative form of play in metaverse. J Virtual Worlds Res 4(1)
Wiederhold BK (2022) Ready (or Not) player one: initial musings on the metaverse. Cyberpsychol Behav Soc Netw 25(1):1–2

Wright M, Ekeus H, Coyne R, Stewart J, Travlou P, Wright RW, Coyne E, Williams S (2008) Augmented duality: overlapping a metaverse with the real world. In: Proceedings of the international conference on advances in computer entertainment technology, ACE, pp 263–266

Yim MYC, Chu SC, Sauer PL (2017) Is augmented reality technology an effective tool for E-commerce? an interactivity and vividness perspective. J Interact Mark 39:89–103