Technological Forecasting & Social Change 210 (2025) 123870

Contents lists available at ScienceDirect

Technological Forecasting & Social Change

journal homepage: www.elsevier.com/locate/techfore

Identifying the metaverse value recipe(s) affecting customer engagement and well-being in retailing

Gaganpreet Singh [a], Sanjit K. Roy [b], Chrysostomos Apostolidis [c,*], Mohammed Quaddus [d], Saalem Sadeque [e]

[a] OP Jindal Global University, Sonipat, India
[b] School of Business & Law, Edith Cowan University, Perth, Australia
[c] Durham University Business School, Durham University, Durham, UK
[d] School of Management and Marketing, Faculty of Business and Law, Curtin Business School, Curtin University, Australia
[e] School of Business and Law, Edith Cowan University, 270 Joondalup Drive, Joondalup, WA 6027, Australia

ARTICLE INFO

Keywords:
Metaverse
fsQCA
Value recipes
Customer engagement
Subjective well-being
Affordance theory

ABSTRACT

Following the increasing interest of retailers in engaging with their consumers using digital channels and platforms, this study uses affordance theory and Leroi-Werelds' value typologies as a theoretical lens to identify recipes (i.e., combinations) of positive and negative affordances that facilitate or impede their interactions with the metaverse in the retail context. More specifically, the study aims to unveil the complex interplay between different value dimensions influencing customer engagement in the metaverse and their impact on customers' well-being. Fuzzy-set qualitative comparative analysis (fsQCA) was used to analyse data from Australian consumers. This research deviates from earlier studies that have focused on the identification of positive drivers of customer engagement, considering instead the trade-offs between positive and negative factors and investigating their impact on customer engagement and subjective well-being in a technology-centric context. The study reveals numerous pertinent 'value recipes' that contribute to our existing knowledge regarding the factors that affect customer engagement and subjective well-being in the metaverse. The theoretical contribution of this study lies in the development of several affordance combinations that can explain engagement and well-being in customer-metaverse interactions. From a practical standpoint, the findings suggest guidelines for successfully infusing the metaverse into the retail landscape.

1. Introduction

The metaverse is rapidly transforming retail by creating new experiences and altering the ways in which customers interact (Ahn et al., 2024; Koohang et al., 2023). The metaverse in retail enables consumers, through digital illustrations of themselves (otherwise referred to as avatars), to traverse a virtual shopping area and interact with fellow avatars and retail employees (Yoo et al., 2023). For instance, Gucci, an Italian fashion brand, created '*Gucci Vault Land*' in the metaverse. This experimental space enables users to go through a collection of the brand's vintage products, which are displayed on the metaverse but unavailable for sale. This new initiative is part of a larger strategy by Gucci, aiming to enhance the sale of physical goods and sell virtual versions of its products to metaverse users (Marr, 2022). With several significant retailers looking to compete in the 'virtual' future, the metaverse market is predicted to have an impact value (cash impact) of between $8 trillion and $13 trillion by 2030 (James, 2022).

The metaverse blends the physical and virtual worlds, enabling customers to interact with one another in a virtual environment, and is increasingly being used by businesses as a platform to drive customer engagement (Belk et al., 2022; Hennig-Thurau et al., 2023). This is due to its potential to offer opportunities for meaningful virtual interactions, including conversational commerce, product testing, and interactions with the brand's mascot (Buhalis et al., 2022; Dwivedi et al., 2023a). Nevertheless, customer engagement with new technologies, such as the metaverse, has been a controversial area and a pain point for organisations for many years. For instance, studies have highlighted how issues such as lack of resources, limited knowledge and understanding, or the

* Corresponding author.
E-mail addresses: gaganpreet@jgu.edu.in (G. Singh), sanjit.roy@ecu.edu.au (S.K. Roy), chrysostomos.apostolidis@durham.ac.uk (C. Apostolidis), M.Quaddus@curtin.edu.au (M. Quaddus), s.sadeque@ecu.edu.au (S. Sadeque).

https://doi.org/10.1016/j.techfore.2024.123870
Received 9 October 2023; Received in revised form 24 September 2024; Accepted 31 October 2024

digital divide within specific industries or the society as a whole may affect engagement with new technologies (Engås et al., 2023; Xi et al., 2023), while several cognitive, emotional and contextual factors (such as the introduction of new technologies and changing trends in the market) may affect long-term engagement with these technologies (Suh, 2023; Yan et al., 2021). In addition to improving customer engagement, the metaverse can support customer decision-making, thereby simplifying customers' lives (Kumar et al., 2021, 2023). Hence, engaging with retailers in the metaverse can enhance subjective well-being (Dwivedi et al., 2022; Hadi et al., 2024). For instance, the metaverse may offer users the opportunity to fulfil their social needs without physical interactions, thereby contributing to their well-being (Oh et al., 2023). Therefore, the ability of the metaverse to improve customer engagement and well-being can be the essential driver of metaverse use (Dwivedi et al., 2022). To date, however, limited research has examined the factors influencing customer engagement and subjective well-being in the retail metaverse.

Existing research suggests several possible antecedents to customer engagement and well-being in the metaverse (Dwivedi et al., 2022; Papagiannidis et al., 2017). In this study, we propose that customers' perceived value is one of the main antecedents of customer engagement (Jo, 2023; Xie et al., 2021) and contributes toward their subjective well-being (Aboelmaged et al., 2021; Kang, 2020). The conceptualisation of customers' perceived value in past studies has been varied. For instance, Itani et al. (2019) and Kang (2020) considered a unidimensional conceptualisation of perceived value to determine its impact on customer engagement and subjective well-being, respectively. On the other hand, several scholars believe that perceived value is multidimensional (Gallarza et al., 2017; Seo and Lee, 2008). For instance, in advanced technological environments like the metaverse, considering perceived value in isolation (i.e., as a unidimensional concept) may not capture the complex trade-off effects and may fail to unveil the various motivations behind technology, and the relationships between perceived value and consumer behaviour, in a holistic manner.

Perceived value can be defined as the net difference between perceived benefits and costs (Zeithaml, 1988; Zeithaml et al., 2020). Therefore, in our case, what customers sacrifice to access the metaverse may be perceived as a cost, while what they receive may be viewed as benefits, and their behaviour is dependent on whether the perceived benefits exceed the perceived costs (Homans, 1958). This view is also aligned with the foundational premise of engagement, which suggests that customers will only remain engaged (e.g., with a firm, organization, or activity) if the perceived benefits exceed the perceived cost (Pansari and Kumar, 2017). For example, customers' decision to engage with the metaverse will depend on them perceiving a positive net difference between the benefits received and costs incurred from engaging with the metaverse. Furthermore, Brodie et al. (2011) argued that perceived value could drive customer engagement, while other studies suggest that perceived value may also influence customers' subjective well-being (Aboelmaged et al., 2021; Prentice and Loureiro, 2018).

These perceived benefits and costs, however, may not be the same for everyone, as different people use technology in different ways to achieve their individual goals. This 'value-in-use' perspective can be better understood by incorporating the fundamentals of affordance theory, according to which individuals perceive differently the possibilities for action their environment 'affords' them, depending on the goals they strive to achieve (Gibson, 1979). This means that the perceived benefits (and costs) of a technology lead to specific perceived possibilities for action, which, however, are subjective, and depend on the context and the goals that different consumers aim to achieve. This has led to the distinction between positive affordances, which are related to the perceived benefits and are desired or expected, and negative affordances (or anti-affordances), which are perceived by some consumers as undesired, as they associate them with perceived costs and can stifle their adoption of new technologies (Apostolidis et al., 2021; Glover, 2022). Specific combinations of affordances and anti-affordances can make some technologies more versatile and desirable than others, as they allow different users to pursue their goals (Glover, 2022).

In the context of the metaverse, affordance theory highlights the relationship between customer engagement and technological capabilities which provide the potential for a particular action (Lee et al., 2024). For instance, from an affordances perspective, different users have the opportunity to engage with the metaverse as a platform for more immersive gaming (Ning et al., 2023), accessible and convenient hospitality and tourism experiences and events (e.g., Gursoy et al., 2022), and inclusive social interactions and artistic expression (Hadi et al., 2024). From a marketing perspective, the metaverse also offers different opportunities for organisations to engage in more interactive communication, seamless omnichannel experiences, virtual product testing, and engaging communities (Dwivedi et al., 2022; Hadi et al., 2024). However, limited research to date has explored the combinations of positive and negative affordances and how they affect customer engagement and well-being.

As the search for different affordances may lead to different perceptions of the metaverse's value, this paper attempts to identify the multiple, distinct, empirically validated combinations of perceived benefits and costs that can affect customer engagement and subjective well-being, using the retail metaverse as a popular application of metaverse technologies (Dwivedi et al., 2022; Hadi et al., 2024). These different combinations of perceived benefits and costs are, hereafter, referred to as '*value recipes.*' Thus, this study aims to identify the *value recipes that facilitate or impede customer engagement and subjective well-being while interacting in the retail metaverse.*

Adopting Zeithaml's (1988) view of perceived value as the net difference between perceived benefits and costs, we build our conceptualisation by adapting the value classification proposed by Leroi-Werelds (2019). This value classification is an evolved conceptualisation of perceived value, which considers both positive values (perceived benefits) and negative values (perceived costs) an imperative for examining advanced technological environments like metaverse retail. By incorporating the negative value types in its typology, Leroi-Werelds (2019) overcame the 'positive bias' (Gallarza et al., 2017, p. 754) shortcoming, one of the most widely acknowledged challenges with value classifications established in the literature (Holbrook, 1996, 1999).

The current study draws on affordance theory (Gibson, 1979) to conceptualise the relationships and trade-offs between perceived benefits and costs and customer engagement and well-being in the context of the retail metaverse. Fuzzy-set qualitative comparative analysis (fsQCA) (Ragin, 2009) is used to identify the value recipes. fsQCA was considered an appropriate methodology for the research, as it serves to unveil complex relations among variables and offer multiple solutions that explain an outcome (Ragin, 2009). The study reveals numerous interesting (and in some cases paradoxical) value recipes that facilitate customers' engagement and subjective well-being while interacting in metaverse retail. For instance, our findings suggest that supporting a combination of positive affordances (i.e., convenience, excellence, status, personalisation, control, novelty, and relational benefits) but also managing effectively a combination of negative affordances (i.e., effort, security, privacy, and performance risk) can produce both high customer engagement and subjective well-being.

The present study contributes to the literature in the following ways. First, it is the first study that combines Gibson's (1979) affordance theory with Leroi-Werelds' (2019) value typologies, and it adopts an fsQCA methodology to provide empirical evidence on the combinations of factors that affect customer subjective well-being and engagement. Furthermore, existing literature concentrates mostly on investigating the impact of individual technology characteristics and traits on customer engagement with the metaverse (Dwivedi et al., 2023a; Wongkitrungrueng and Suprawan, 2023). Nevertheless, since perceived benefits and costs have complex trade-off effects, our study focuses on unveiling the complex relationships between them. Additionally, given that affordance theory argues that individuals may be searching for different opportunities when engaging with metaverse technologies, and as such, that they may evaluate differently the benefits and costs of this technology, we identify a number of different value recipes (distinct combinations of positive and negative factors). Furthermore, the results empirically validate Leroi-Werelds' (2019) value typology in the retail metaverse context, thereby validating and generalizing its theoretical conceptualisation. Finally, contributing to existing literature that focuses on the direct relationship between select positive value types and subjective well-being (Aboelmaged et al., 2021), the findings of this study highlight that subjective well-being in the retail metaverse is affected by both positive and negative values.

The subsequent section details the theoretical underpinnings of the study. Next, the research methodology, data collection and data analysis are described. The paper concludes with a discussion and study implications.

2. Literature review

2.1. Contextual background: retailing in the metaverse

Retailing in the metaverse refers to the digital universe where consumers and their avatars engage with brands and trade physical or digital products (Gadalla et al., 2013; Koohang et al., 2023). According to James (2022), the metaverse is predicted to have an impact value between $8 trillion and $13 trillion by 2030. Anticipating its opportunities, retail brands such as Nike, Puma, Gap, Clarks, Tommy Hilfiger, and Gucci (Cameron, 2021) have started to engage with consumers in the metaverse.

The metaverse bridges the gap between the real and virtual retail worlds (Yoo et al., 2023). The intersection is a meta-ecosystem that hosts and connects several platforms using mixed, virtual, and augmented reality to generate a metaverse experience (Schöbel and Tingelhoff, 2023). Interoperability and persistency are two metaverse pillars that allow customers to navigate platforms without restrictions (Schöbel and Tingelhoff, 2023). Thus, the metaverse is defined as a "*technology-mediated network of scalable and potentially interoperable extended reality environments merging the physical and virtual realities to provide experiences characterized by their level of immersiveness, environmental fidelity, and sociability*" (Barrera and Shah, 2023, p.6).

Literature has extensively examined the antecedents of customer engagement and subjective well-being in technology-centric contexts (e.g., Hadi et al., 2024; Hollebeek, 2019). However, the traditional marketing strategies that retailers adopt to influence customers' engagement and enhance their subjective well-being may not be replicated effectively in the metaverse environment. This is because the metaverse is distinct and integrates various technologies (Park and Kim, 2022; Zhou et al., 2024). As a limited number of metaverse retailers have been able to offer a deep sense of customer engagement and elevate customer well-being (Dwivedi et al., 2022, 2023a), it is critical for metaverse retailers to determine ways to influence engagement and serve their customers more effectively. Thus, the context of this study is quite timely and relevant.

2.2. Theoretical background: affordance theory

Affordance theory (Gibson, 1979) has been recently applied in several studies on human-technology interactions (Apostolidis et al., 2021; Shao et al., 2024; Lin and Kishore, 2021; Zhang et al., 2023). The key tenet of affordance theory in this context is that affordances provided by technology allow individuals to achieve their goals. Affordances refer to the qualities, either perceived or inherent, of objects or surroundings that provide clues to users about potential uses or ways of interaction (Leonardi, 2011; Shin, 2022). On the other hand, several studies distinguish positive from negative affordances or 'anti-affordances' (e.g., Apostolidis et al., 2021; Glover, 2022), as a way to highlight the potential for some features of an object or environment to be perceived negatively and operate as constraints, rather than enablers, of its use and adoption. From this perspective, a digital technology might offer a rich array of positive and negative affordances that may support but also inhibit customer engagement and well-being. In this sense, affordances are subjective rather than objective, as features which generate positive affordances for one group of people might be associated with negative affordances by another group.

In other words, individuals judge whether a technology is appropriate for fulfilling specific needs and tasks by using their perceptions and interpretations of the affordances provided by that technology (Leonardi, 2011; Leung et al., 2023; Shao et al., 2024). In the context of the present study, we posit that the retail metaverse could offer several affordances (positive and negative) to consumers, based on the benefits and costs they perceive due to their overarching needs and goals. For instance, in the retail metaverse, users can join communities, interact with other consumers, purchase (virtual) products, and personalise their digital personas and virtual environment. However, the presence of features that enable affordances does not guarantee that these affordances will be actualised (Anderson and Robey, 2017; Shin, 2022). Affordance actualisation refers to the process whereby users take advantage of the affordances that the technology offers to obtain a concrete outcome that supports their motivation (Shin, 2022; Strong et al., 2014). Affordance actualisation recognises that not all users will use the technology in the same way to achieve their goals, as negative affordances may lead to undesirable outcomes (costs), which may inhibit its adoption (Lei et al., 2019; Leonardi, 2011). Our study posits that this can be explained by noting that a technology's affordance actualisation will occur when there is overall positive perceived value based on the affordances of the technology.

In other words, the existence of affordances and users' ability to take advantage of them is not sufficient for affordance actualisation, if the users perceive that the value obtained from enabling those affordances is not positive based on their needs. This implies that affordance actualisation in the context of the retail metaverse will occur only when retail customers perceive net positive perceived value by engaging with the retail metaverse: that is, if the perceived benefits from actualising this affordance (e.g., engaging in virtual reality events) exceed the perceived cost of using this technology (e.g., privacy and security risks).

2.3. Perceived value of the metaverse

The literature discusses the benefits offered by the metaverse through the lens of value creation (Dwivedi et al., 2022; Gleim et al., 2024). This implies that the metaverse provides opportunities for value creation and co-creative interactions (Bao et al., 2024; Buhalis et al., 2022). For instance, by blurring the boundaries between the virtual and the physical environment, the metaverse enables customers to shop in a hybrid mode more conveniently. Further, it also supports value creation by allowing personalisation and customisation of experiences (Neuhofer et al., 2015). Overall, the ability of the metaverse to offer ultimate control of the virtual space enables the generation of customisable and personable environments that can benefit customers.

Despite the benefits that the metaverse can offer, the literature also highlights some of its drawbacks (Dwivedi et al., 2023b). Privacy concerns, the rise of the digital divide, and security concerns are among several reasons that are likely to reduce customers' perceived value (Kumar et al., 2021). For instance, due to the immersive nature of the metaverse and the multi-sensory involvement, more user data is gathered, raising privacy and security concerns (Dwivedi et al., 2023b; Mkedder and Das, 2024). These concerns reflect negative affordances, which are perceived as customer costs while interacting in the metaverse.

According to Zeithaml (1988), perceived value can be evaluated as an exchange between these benefits and costs. Based on this definition, numerous 'typologies of value' have been developed (Sheth et al., 1991;

Sweeney and Soutar, 2001; Sánchez-Fernández et al., 2009), with the value classification proposed by Holbrook (1996) being the most frequently cited (Gallarza et al., 2017), Holbrook's typology of values is considered one of the most comprehensive (Sánchez-Fernández et al., 2009), as it uncovers a broader range of eight value sources, namely: *efficiency, excellence, status, esteem, play, aesthetics, ethics,* and *spirituality*.

More recently, however, Gallarza et al. (2017) highlighted a positivity bias in the studies using Holbrook's (1996) typology of consumer value: that is, a clear focus on the positive aspects of value (i.e., the benefits), as trade-offs between benefits and costs are only implicitly included in one of the value types, namely *efficiency*. Leroi-Werelds (2019) extended the fundamentals of Holbrook's typology and updated the value typologies, taking into consideration the recent advancements in academic and business practices, including the infusion of new technologies in business operations. Leroi-Werelds (2019) explicitly included the negative aspects in the value trade-off (i.e., the costs) and revised Holbrook's value typologies. The updated value classification has 14 positive (benefits) and 10 negative (costs) value types. Nevertheless, as customers' perceived value is situation-specific, and the value types differ in different contexts, in this study, we adapt the value classification proposed by Leroi-Werelds (2019) and specifically focus on those value types that are applicable in the context of the retail metaverse (see Table 1).

2.4. Customer engagement

Customer engagement has been emphasized as an important concept in technology research (e.g., Muhammad et al., 2021; Roy et al., 2021). Only through their engagement with technology can consumers realize the affordances that this technology can offer and receive the value that will enable them to achieve their goals (Apostolidis et al., 2021). Denoting its multidimensional nature, scholars (e.g., Brodie et al., 2011; Hollebeek et al., 2019; Kumar et al., 2019) define customer engagement as a customer's motivationally driven, volitional investment of resources in their interactions with an object or platform (e.g., the metaverse). Considering the different types of perceived benefits they may receive, customers also need to contribute different types of resources, such as cognitive, emotional, and/or physical (Higgins and Scholer, 2009), which can lead to different engagement types in the metaverse. Cognitive engagement represents the customer's thought-based resource investment (e.g., cognitive processing). In contrast, affective customer engagement highlights emotional investment, while behavioural engagement reflects the customer's time, effort, and energy while interacting in the metaverse.

Customer engagement also incorporates positive (i.e., metaverse-supporting) expressions, such as customer citizenship, but also negative (i.e., metaverse-detracting) expressions, such as complaint behaviour (Hollebeek and Chen, 2014; Zhang et al., 2021), which relate to customer-perceived benefits and costs, respectively. In our study, we propose that customers deriving enhanced value from metaverse interactions are likely to continue engaging with the metaverse (Ghali et al., 2024; Wong et al., 2023). Conversely, those perceiving low value in metaverse interactions are more likely to discontinue using the metaverse, thus lowering their future customer engagement (Wong et al., 2023).

Table 1
Leroi-Werelds' (2019) value typology adapted for the retail metaverse.

Benefits (Positive Values)	Convenience (efficiency) (P1)	The extent to which the metaverse makes the customer's life easier.
	Excellence (P2)	The customer's assessment of the metaverse (e.g., its overall usefulness).
	Status (P3)	The extent to which metaverse customers leave a positive impression on others.
	Enjoyment (P4)	The ability of the metaverse to yield customer-perceived fun, entertainment, or pleasure.
	Personalization (P5)	The extent to which the metaverse is adaptable to individual customers' needs, wants, and desires.
	Control (P6)	The extent to which customers can exert influence on their purchase/ consumption process and its outcomes.
	Novelty (P7)	The perceived extent to which metaverse incites customers' curiosity and/or satisfies their appetite for new retail features
	Relational benefits (P8)	It is an essential gateway to attracting other or like-minded customers to the store by permitting customers to share their metaverse benefits with others.
Costs (Negative values)	Effort (N1)	The extent to which accessing metaverse services requires effort to use and understand.
	Privacy risk (N2)	The extent to which accessing the metaverse can result in a loss of privacy.
	Security risk (N3)	The degree to which accessing the metaverse can result in security issues.
	Performance risk (N4)	The inability of the metaverse to perform as expected
	Financial risk (N5)	The extent to which the metaverse can result in a loss of money.
	Physical risk (N6)	The extent to which the metaverse can result in health issues.

Note: P represents positive value types; N represents negative value types.

2.5. Subjective well-being

The role of the metaverse in alleviating, perpetuating, or exacerbating issues relating to consumer well-being is a controversial topic that has been discussed in several studies. While some studies argue that the metaverse can improve inclusion, accessibility to resources, and services for disadvantaged groups, and reduce the impact of consumption on environmental and social sustainability, on the other hand, issues relating to data privacy, mental health, loneliness and addiction to a simulated reality are some of the concerns relating to the use of the metaverse (Dwivedi et al., 2022, 2023a, 2023b; Hadi et al., 2024; Oleksy et al., 2023).

Subjective well-being is a recognized metric that individuals use to evaluate the quality of their lives (Diener and Emmons, 1984; Gallan et al., 2019; Su et al., 2016). Specifically, it refers to the appraisal of one's life as satisfactory (Diener and Emmons, 1984). Building on this premise, from an affordance theory perspective, the metaverse may offer consumers the potential to improve their well-being. For instance, through personalization, increased control and enjoyment, the metaverse can benefit consumers trying to improve their interactions or their acceptance by others. Therefore, its benefits are expected to impact subjective well-being positively. Conversely, the metaverse incurs customer-perceived costs, including performance-, privacy-, or security-related risks (Leroi-Werelds, 2019), which are likely to negatively affect subjective well-being. Against this backdrop, we propose the following:

Proposition 1. The presence of both positive (such as convenience, excellence, and others) and negative value types (such as effort, security risk and others) is a prerequisite condition (for a metaverse value recipe) to predict customer engagement and subjective well-being in a retail metaverse.

Proposition 2. The metaverse value recipe of positive and negative value types will differ for different outcomes (customer engagement and subjective well-being).

3. Value recipes: the configurational model

Since customer engagement and subjective well-being are complex and critical constructs in the marketing domain (Briki, 2019; Fliess et al., 2012), their assessment entails investigating different 'configurations' of metaverse affordances (and their associated benefits or costs) to ultimately develop a more effective causal model. A Venn diagram shows the proposed configurational model investigated in this paper (Fig. 1). As shown in the diagram, customers' engagement and subjective well-being represent a complex behavioural and perceptual manifestation of affordances that evolves due to the interplay of both positive and negative values. Consistent with this, the concept of configurational modelling (Olya et al., 2018; Rihoux and Ragin, 2008) was selected to unravel the complexities and form a 'recipe' consisting of a combination of different causal antecedents to explain the outcomes. Specifically, in this study, we chose positive and negative value types as the constituents of a causal configuration, referred to as the 'value recipe.' Thus, the 'value recipe' is the desired combination of value types likely to define customer engagement and subjective well-being in the metaverse context. As informed by the literature, consistency and coverage were used as the two criteria to select a value recipe(s) capable of ensuring increased customer engagement and subjective well-being in the metaverse. Methodologically, the procedural technique of fsQCA was used to develop the value recipe (Pappas and Woodside, 2021; Ragin, 2009).

4. Methodology

4.1. Fuzzy-set qualitative comparative analysis (fsQCA) method

The existing literature supports the claim that the net effect of a single independent variable is inadequate to explain the dependent variable. Therefore, examining independent variable(s) in multiple configurations is imperative to explore and holistically examine the dependent variable (Misangyi and Acharya, 2014; Misangyi et al., 2017). Consistent with this premise, the literature advocates that fsQCA is one of the most effective methodological procedures capable of combining independent variable(s) in different combinations (or configurations) that effectively explain the dependent variable. These configurations are referred to as value recipes.

Consistency and coverage are the two criteria that can be used to effectively evaluate these value recipes. Consistency in fsQCA is equivalent to significance in a statistical sense, referring to the degree to which a configuration leads to the outcome (Lewellyn and Muller-Kahle, 2022; Ragin, 2008). The latter assesses the degree to which a causal combination accounts for instances of an outcome (Ragin, 2008). Specifically, the coverage indicates the empirical relevance or importance of a configuration (Ragin, 2008). In the present study, both consistency and coverage were measured on a scale from 0 to 1.

4.2. Study design and data collection

To capture data and examine respondents' contextualized understanding of hypothetical situations, a scenario-based study design was used. This approach is essential, especially when the research context under investigation is like the metaverse, where empirical research to date is limited (Zhang et al., 2023). Vignettes were employed to effectively describe the hypothetical situation and provide detailed information that would allow the investigation of consumer behaviour in a hypothetical metaverse shopping context. Additionally, vignette-based study design scenarios offered multiple methodological benefits, such as focusing on realistic situations, avoiding memory lapse biases, and enabling convenient data collection from large samples (Zhang and Leidner, 2018). In this study, the scenario allowed participants to make behavioural decisions based on vignettes representing realistic situations in a hypothetical metaverse shopping scenario (Zhang et al., 2023).

The scenario script was tested to restrict confounding effects and ensure realism (Tombs and McColl-Kennedy, 2013). First, the scenario was developed using actual metaverse encounters mentioned in the academic literature (Zhang et al., 2023). Second, the scenario was tested using an expert panel comprising marketing academics from a leading business school and practising retail store managers in Australia. The scenario snapshots and introduction are shown in Appendix A. To test the realism of the scenario, we adopted the following three items on a scale of 1–7 with items (1) and (2) reversed: (1) the scenario gives no idea about shopping in the metaverse; (2) with this scenario, it is difficult to imagine shopping in the metaverse; and (3) with this scenario, I can imagine shopping in the metaverse environment to some extent (Zhang et al., 2023). With an average rating of 6.2 out of 7, the results confirmed adequate scenario realism.

We used an Australian panel provider to invite 1300 Australian consumers from its database to complete an online questionnaire. The screening criteria for eligibility were (a) whether participants had visited the metaverse in the last eight months and (b) whether they used any intangible assets for their Avatar that were available in the metaverse, either free or purchased (Arya et al., 2023). Investigating the Australian sample was appropriate, since metaverse adoption among Australians is one of the highest globally, with the user penetration rate

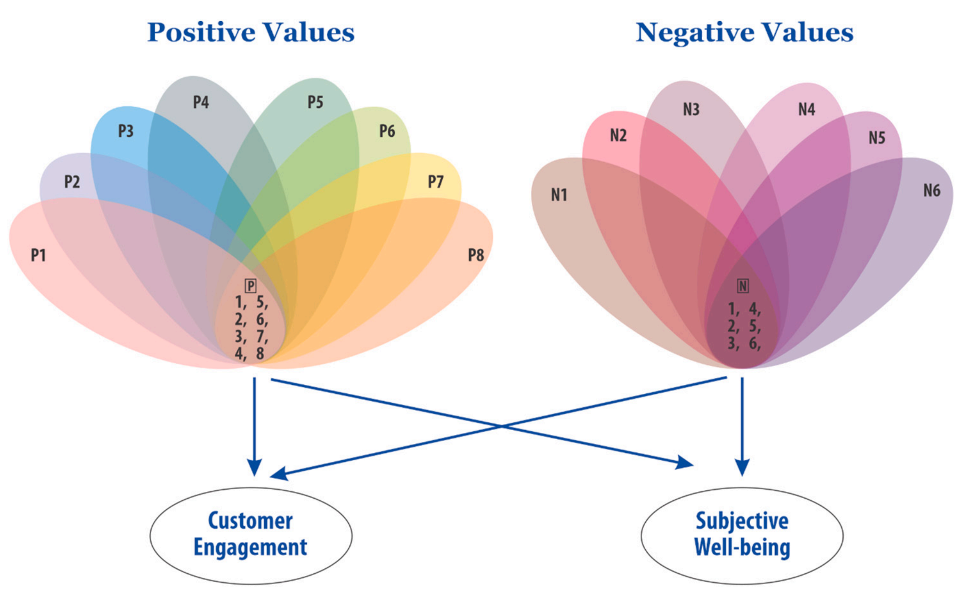

Fig. 1. Proposed configurational model. Note: P1: Convenience (efficiency), P2: Excellence, P3: Status, P4: Enjoyment (play), P5: Personalisation, P6: Control, P7: Novelty, P8: Relational benefits, N1: Effort, N2: Privacy risk, N3: Security risk, N4: Performance risk, N5: Financial risk, N6: Physical risk.

(i.e., the percentage of the population using the metaverse market) expected to touch 40.1 % in 2030, from 13.1 % in 2023. A total of 356 metaverse users completed the questionnaire. Following data cleaning and removal of incomplete surveys, a final sample of 298 respondents was used for the analysis. Among 298 participants, 146 had an account in Zepeto, and 152 had an account in Roblox. On average, participants spent approximately 1 h every day in either Roblox or Zepeto. Their ages ranged from 18 to 42 years, and 43 % were females. Appendix A presents the scenario used in the current study.

4.3. Measures

The measurement scales of the constructs used in defining value recipes (positive values, negative values, customer engagement, and subjective well-being) were adopted from existing literature and adapted for the metaverse context. Scales relating to positive and negative value types, including convenience (Pihlström and Brush, 2008), excellence (Cronin et al., 2000; Gallarza et al., 2017), status (Nasution and Mavondo, 2008), enjoyment (Gallarza et al., 2017), and personalisation (Veloutsou and McAlonan, 2012) were adapted from existing studies. Furthermore, the survey included scales adapted from existing literature measuring control (Kleijnen et al., 2007), novelty (Wells et al., 2010), relational benefits (Chan et al., 2010), effort, security, and physical risk (Mani and Chouk, 2018), privacy risk (Lin et al., 2005), performance risk (Kleijnen et al., 2007), and financial risk (Forsythe et al., 2006). Finally, customer engagement scale items were adapted from Hollebeek et al. (2014), and subjective well-being scales were adapted from Su et al. (2016). These measures are presented in more detail in Appendix B.

4.4. Common method bias

Common method bias (CMB) was tested in this study using two tests. First, we used Harman's single-factor test (Podsakoff et al., 2003), which revealed that the first factor accounted for <50 % of the variance. Next, we applied the marker variable method of Lindell and Whitney (2001) to check for the presence of CMB. We added the marker variable (i.e., gender) with the lowest degree of correlation to the structural equation model for assessment. Results show that the significance of all predicted paths remained unchanged, which suggests that CMB was not a significant issue in this study.

5. Data analysis

5.1. Measurement properties

Confirmatory factor analysis (with AMOS 25.0) was used to test the measurement properties of the constructs in this study and also to evaluate the reliability and validity of the measurement model. Results showed that the fit indices of the measurement model were acceptable (χ^2/df. = 2.83; CFI = 0.95; TLI = 0.94; NFI = 0.93; RMSEA = 0.05) (Hu and Bentler, 1999; Schumacker and Lomax, 2004). The reliability of the constructs was acceptable, as shown in Table 2, which presents the Cronbach's alpha and composite reliability values. All the Cronbach's alpha values were greater than the recommended value of 0.7, and the construct reliability values were >0.6 (Hair et al., 2010). Additionally, we used Fornell and Larcker's (1981) method to test the convergent and discriminant validity of the measurement model. As shown in Table 2, the factor loadings of all the measurement items on the constructs were significant and >0.5, and the average variance extracted (AVE) of all the constructs was >0.5, indicating the measurement model's convergent validity. Results show that the AVE values of all the constructs were greater than the inter-construct correlations, thus demonstrating the discriminant validity of the measurement model.

Table 2
Psychometric properties of the measurement model.

Value types	Factor loadings	α	CR	AVE
Convenience				
C1	0.735	0.881	0.881	0.601
C2	0.785			
C3	0.778			
C4	0.783			
C5	0.780			
Excellence				
E1	0.787	0.838	0.839	0.566
E2	0.760			
E3	0.724			
E4	0.736			
Status				
S1	0.787	0.873	0.873	0.633
S2	0.781			
S3	0.825			
S4	0.789			
Enjoyment				
EN1	0.751	0.806	0.807	0.582
EN2	0.753			
EN3	0.785			
Personalization				
P1	0.733	0.838	0.839	0.565
P2	0.745			
P3	0.783			
P4	0.745			
Control				
CT1	0.785	0.817	0.817	0.601
CT2	0.792			
CT3	0.747			
Novelty				
NO1	0.803	0.792	0.79	0.558
NO2	0.711			
NO3	0.723			
Relational benefits				
R1	0.804	0.828	0.828	0.617
R2	0.777			
R3	0.775			
Effort				
EF1	0.718	0.781	0.783	0.545
EF2	0.731			
EF3	0.766			
Security risk				
S1	0.854	0.905	0.905	0.761
S2	0.866			
S3	0.897			
Privacy risk				
PV1	0.863	0.825	0.848	0.652
PV2	0.728			
PV3	0.825			
Performance risk				
PR1	0.776	0.881	0.881	0.649
PR2	0.784			
PR3	0.845			
PR4	0.815			
Financial risk				
F1	0.832	0.927	0.929	0.720
F2	0.890			
F3	0.835			
F4	0.870			
F5	0.813			
Physical risk				
PH1	0.917	0.939	0.939	0.838
PH2	0.912			
PH3	0.917			
Customer engagement				
Affective engagement				
AFF1	0.828	0.894	0.895	0.680
AFF2	0.803			
AFF3	0.827			
AFF4	0.840			
Behavioural engagement				
BEH1	0.851	0.790	0.792	0.656
BEH2	0.767			

(continued on next page)

Table 2 (*continued*)

Value types	Factor loadings	α	CR	AVE
Cognitive engagement				
COG1	0.763	0.774	0.773	0.631
COG2	0.732			
COG3	0.690			
Subjective well-being				
SWB1	0.831			
SWB2	0.729	0.846	0.850	0.659
SWB3	0.870			

Notes*:* α: Cronbach's alpha; CR: Composite reliability; AVE: Average variance extracted.

5.2. Findings of fsQCA

Following the initial analysis of the data, we then analysed a range of models to investigate which combinations of positive and/or negative values predicted the positive and negative scores of the outcome variables, namely customer engagement and subjective well-being, with acceptable quality indices (consistency and coverage). Based on extant literature, we followed the fsQCA protocol (Pappas and Woodside, 2021). In doing so, we first conducted necessity analysis, followed by sufficiency analysis.

5.2.1. Data transformation

fsQCA starts with transforming the data into fuzzy variables. This study collected all data using a Likert scale from 1 to 7. In a fuzzy rule, a full non-membership should have a score of ≤0.05, full membership will have a score of ≥0.95 and above, and a cross-over point will have a score of 0.5 (Ordanini et al., 2014; Ragin, 2008). In this study, the threshold values of 6.0 (agree), 4.0 (neither agree nor disagree) and 2.0 (disagree) were used as full membership, cross-over point, and full non-membership, respectively.

5.2.2. Necessity analysis

The necessity analysis was performed using the fsQCA 3.0 software. The main aim was to identify the positive and negative value types necessary for higher or lower scores of the outcome variables (customer engagement and subjective well-being). As per the definition, a condition is necessary if it is always present whenever the outcome (e.g., increased customer engagement) occurs. However, it may not be sufficient, as some combination of this and other conditions may be required to produce the required outcome.

5.2.2.1. Outcome variable: customer engagement. Table 3 shows the necessary positive value conditions (PVs) for higher levels of customer engagement. In fsQCA, a condition is deemed necessary when its consistency value is >0.9 (Pappas and Woodside, 2021; Ragin, 2008). It was observed that all PVs were necessary to increase engagement, as all conditions had consistency and coverage >0.9 (Table 3). Negation of any of the PVs (~PV) was not necessary to impede engagement as none of the negative PVs had consistency higher than 0.9, although negation of status (~P3) and relational benefits (~P8) had higher consistencies (<0.85).

In analysing the negative values (NVs) to impede or increase engagement, we found that three NVs (security, performance and financial) had consistencies of 0.89, 0.91 and 0.89, respectively, to impede engagement. On the other hand, the results revealed that negation of NV (~NV) was not necessary to increase engagement.

5.2.2.2. Outcome variable: subjective well-being. All PVs were also necessary to increase subjective well-being, as all had consistency and coverage values higher than 0.9. In the negation analysis, we found that the negation of PVs (~PV) was unnecessary to impede subjective well-being. This shows the asymmetric nature of the relationship between PVs and subjective well-being. On the relationship between negative values (NVs) and subjective well-being, it was found that only one NV (effort) was necessary to impede subjective well-being. Negation of NV (~NV) was not necessary to increase subjective well-being.

In summary, the necessity analysis shows consistent results for both outcome variables. According to our analysis, the examined benefits (PVs) were necessary to increase both customer engagement and subjective well-being. In terms of perceived costs (NVs), it was shown that while some NVs impeded customer engagement and subjective well-being, their negation was not required to increase engagement and well-being. Thus, an asymmetric relationship existed between NVs and customer engagement and subjective well-being.

5.2.3. Sufficiency analysis

Analysis of sufficient conditions identifies various configurations leading to the outcomes. A condition (or configuration of conditions) is sufficient when its occurrence always leads to the required outcome (Lewellyn and Muller-Kahle, 2022; Ragin, 2008). In this study, the outcome variables were engagement and subjective well-being. The antecedent conditions were PVs and NVs. In line with earlier studies (e.g., Pappas and Woodside, 2021), the threshold values for solution consistency and coverage were decided as >0.8 and 0.5, respectively. As per the sufficiency analysis guideline, the truth table was developed first. A frequency threshold of 2 was used to analyse at least 80 % of the cases, while the consistency threshold was 0.8 to discard the low-consistent solutions (Pappas and Woodside, 2021). All these thresholds eventually produced various configurations using the truth table algorithm available in the fsQCA 3.0 software.

5.2.4. Configuration of PVs and NVs for high and low scores of customer engagement

Table 4 presents various configurations obtained from the truth table analysis for high and low score of engagement using PVs as the antecedents (please see Appendix C for the truth table corresponding to Table 4). For the high score of engagement (shown on the left-hand side of Table 4), two configurations were obtained with overall solution consistency and coverage of 0.974 and 0.908. However, the second configuration (P1*P2*P4*P5*P6*P7*P8) had acceptable consistency and coverage of 0.99 and 0.90. This configuration had all the necessary PVs and was the most desirable configuration to facilitate a high score for engagement, as it was both necessary and sufficient. Interestingly, no configurations of PVs produced any low scores for engagement (as shown on the right-hand side of Table 4).

Table 5 presents the various configurations obtained from truth table analysis for high and low engagement scores, using NVs as the antecedents (please see Appendix C for the truth table corresponding to Table 5). To predict high engagement, three configurations were obtained (as shown on the left-hand side of Table 5) with good overall solution consistency and coverage. However, only one configuration (N1*N3*N2*N4) produced high consistency and coverage of 0.99 and 0.75, respectively, leading to high scores for customer engagement. It is noted that, since the scales were adapted from earlier studies, the

Table 3
Necessary analysis of antecedent conditions (positive values) leading to higher customer engagement.

Conditions (positive values)	Consistency	Coverage
Convenience (P1)	0.973866	0.964138
Excellence (P2)	0.969613	0.967071
Status (P3)	0.932887	0.977835
Enjoyment (P4)	0.954266	0.975536
Personalisation (P5)	0.961611	0.965943
Control (P6)	0.963814	0.974895
Novelty (P7)	0.970657	0.941362
Relational benefits (P8)	0.952487	0.976575

Table 4
Configurations of PVs for high and low scores of customer engagement.

Configurations of positive values (PV) for predicting a high score of customer engagement	RC	UC	C	Configurations of positive values (PV) for predicting a low score of customer engagement	RC	UC	C
~P1* ~ P2* ~ P3* ~ P4* ~ P5* ~ P6* ~ P8	0.078	0.006	0.80	No configurations of PVs produced a low score of customer engagement			
P1*P2*P4*P5*P6*P7*P8	0.90	0.83	0.99				
Solution coverage: 0.908338 Solution consistency: 0.974170							

Notes: RC = Raw coverage, UC = Unique coverage, C = Consistency; P1 = convenience, P2 = excellence, P3 = status, P4 = enjoyment, P5 = personalization, P6 = control, P8 = relational benefit.

Table 5
Configurations of NVs for high and low scores of customer engagement.

Configurations of negative values (NV) for predicting a high score of customer engagement	RC	UC	C	Configurations of negative values (NV) for predicting a low score of customer engagement	RC	UC	C
N1*N3*N2*N4	0.75	0.59	0.99	No configurations of NVs produced a low score of customer engagement			
N1* ~ N3*N2* ~ N5* ~ N6	0.21	0.09	0.99				
N1*N3*N4*N5* ~ N6	0.17	0.02	0.96				
Solution coverage: 0.867218 Solution consistency: 0.986983							

Notes: RC = Raw coverage, UC = Unique coverage, C = Consistency; N1 = effort, N4 = performance risk, N3 = security risk, N2 = privacy risk, N5 = financial risk, N6 = physical risk.

measurement items of N1 (effort) and N2 (privacy) were stated in a positive way (e.g., "..metaverse for shopping is easy…"). However, the items of the remaining NVs were stated in negative ways (e.g., "I worry about whether the service will perform as well as it should"), and thus it would be expected that absence of these features would strengthen customer engagement and well-being.

Nevertheless, the configuration of (N1*N3*N2*N4) reveals that despite the negative orientation of N3 and N4 (performance and security risk), high scores of customer engagement are realised when these antecedents are present, which can be considered a paradoxical case. In many cases, QCA researchers tend to reject cases that are inconsistent with their expectations, as they consider these 'deviant' observations to be outliers and unlikely to be observed in real life. Nevertheless, studies argue that this rejection can significantly reduce the validity and explanatory power of fsQCA, and limit the theoretical contribution of the research, as one of the main advantages of the QCA methods relates to their potential to account for all cases, paradoxical or not (Nair and Gibbert, 2016).

Such paradoxes may also be the result of contrarian cases in our data (Woodside, 2014). Contrarian cases identify asymmetric relationships between the outcome variable and its antecedents (Gligor and Bozkurt, 2020), when relationships contradicting the main effects occur within a sample. The asymmetric relationships in our case refer to configurations including NVs that still enhance positive outcomes (e.g., customer engagement). Fuzzy plots of N1, N2, N3 and N4 with the customer engagement indicated the presence of contrarian cases. The presence of negative antecedents in configurations with high consistency and coverage has been reported in extant literature, where contrarian cases and paradoxical outcomes have been identified (e.g., Ordanini et al., 2014; Schmitt et al., 2017).

Our NV configuration implies that, despite its paradoxical nature, potentially negative affordances, if managed well, will produce high engagement. Our analysis also revealed that there was no configuration of NVs that produced a low score of engagement. Thus, sufficiency analyses reveal that NVs have an asymmetric relationship with customer engagement.

5.2.5. *Configuration of PVs and NVs for high and low scores of subjective well-being*

Table 6 presents various configurations obtained from the truth table analysis for high and low scores of subjective well-being using PVs as the antecedents (please see Appendix C for the truth table corresponding to Table 6). Only one configuration produced high subjective well-being (P1*P2*P4*P5*P6*P7*P8), with a consistency of 0.96 and coverage of 0.88. It was indeed a necessary and sufficient configuration. Interestingly, it was the same configuration which produced a high score for engagement. For the low subjective well-being score, >240 configurations were discarded from the truth table due to very low consistency. With the remaining configurations, the overall solution consistency and coverage were low. Hence, no configurations of PVs can result in low subjective well-being (as shown in the right-hand side of Table 6).

Table 7 presents various configurations obtained from the truth table analysis for high and low scores of subjective well-being using NVs as the antecedents. Only one configuration (N1*N3*N2*N4) produced a high score of subjective well-being, with consistency and coverage of 0.98 and 0.75, respectively. Two other configurations produced high scores for subjective well-being with high consistency (>0.90) but with low coverage (<0.20). This result is similar to our earlier paradoxical results on customer engagement, as it highlights that despite the existence of values with negative orientation, the recipe of (N1*N3*N2*N4) results in positive outcomes on subjective well-being. Table 7 also shows no configuration of NVs producing a low score of subjective well-being. Thus, the findings reveal that NVs also had an asymmetric relationship with subjective well-being.

5.2.6. *Configuration of combined PVs and NVs for high and low scores of customer engagement*

Table 8 presents various configurations obtained from the truth table analysis for high and low scores of engagement using PVs and NVs as combined antecedents (or affordances). For the high score of engagement (shown on the left-hand side of Table 8), six configurations were obtained, with overall solution consistency and coverage of 0.99 and 0.83. However, only the first configuration (P1*P2*P3*P4*P5*P6*P7*P8*N1*N2*N3*N4) had acceptable consistency and coverage, of 0.99 and 0.72 respectively. This configuration involved all eight PVs and four of the six NVs to facilitate the high score of engagement. This is an interesting finding, as fsQCA allows the investigation of trade-offs between positive and negative antecedents, which occurs when a combination of affordances, both favourable and unfavourable, interact to produce a positive outcome. Therefore, a positive outcome can emerge not only from isolated effects of positive antecedents but also from specific combinations of positive and negative antecedents. In our case, this combination included both positive and

Table 6
Configurations of PVs for high and low scores of subjective well-being.

Configurations of positive values (PV) for predicting a high score of subjective well-being	RC	UC	C	Configurations of positive values (PV) for predicting a low score of subjective well-being	RC	UC	C
~P1* ~ P2* ~ P3* ~ P4* ~ P5* ~ P6* ~ P8	0.09	0.01	0.93	No configurations of PVs produced low scores of subjective well-being			
P1*P2*P4*P5*P6*P7*P8	0.88	0.80	0.96				
Solution coverage: 0.899797 Solution consistency: 0.954973							

Notes: RC = Raw coverage, UC = Unique coverage, C = Consistency; P1 = convenience, P2 = excellence, P3 = status, P4 = enjoyment, P5 = personalization, P6 = control, P7 = novelty, P8 = relational benefit.

Table 7
Configurations of NVs for high and low scores of subjective well-being.

Configurations of `negative values (NV) for predicting a high score of subjective well-being	RC	UC	C	Configurations of negative values (NV) for predicting a low score of subjective well-being	RC	UC	C
N1*N3*N2*N4	0.75	0.600	0.98	No configurations of NVs produced low scores of subjective well-being			
N1* ~ N3*N2* ~ N5* ~ N6	0.19	0.08	0.91				
N1*N3*N4*N5* ~ N6	0.16	0.02	0.94				
Solution coverage: 0.859057							
Solution consistency: 0.967766							

Notes: RC = Raw coverage, UC = Unique coverage, C = Consistency; N1 = effort, N4 = performance risk, N3 = security risk, N2 = privacy risk, N5 = financial risk, N6 = physical risk.

Table 8
Configurations of PVs and NVs for high and low scores of customer engagement.

Configurations of PVs and NVs for predicting a high score of customer engagement ink	RC	UC	C	Configurations of PVs and NVs for predicting a low score of customer engagement	RC	UC	C
P1*P2*P3*P4*P5*P6*P7*P8*N1*N2*N3*N4	0.72	0.56	0.99	No configurations of PVs and NVs produced low scores of customer engagement			
P1*P2*P4*P5*P6*P7*P8*N1* ~ N3*N2* ~ N4* ~ N5* ~ N6	0.16	0.01	0.99				
and four other configurations with high consistency but very low raw coverage (between 0.05 and 0.18) Solution coverage: 0.83 Solution consistency: 0.99							

Notes: RC = Raw coverage, UC = Unique coverage, C = Consistency; P1 = convenience, P2 = excellence, P3 = status, P4 = enjoyment, P5 = personalization, P6 = control, P7 = novelty, P8 = relational benefit, N1 = effort, N4 = performance risk, N3 = security risk, N2 = privacy risk, N5 = financial risk, N6 = physical risk.

negative values producing positive customer engagement. In this case, negative antecedents were offset by other strong positive factors. This specifically happened in our case because the combined effect of the positive antecedents on customer engagement compensated for the impact of the negative ones. Thus, our respondents believed that despite the negative affordances associated with the metaverse, it can still enhance customer engagement with retailers. The fsQCA approach reveals interesting insights like this, which are not offered by any symmetric analysis (e.g., structural equation modelling: Pappas and Woodside, 2021). As before, no configurations of combined PVs and NVs produced a low score for engagement (as shown on the right-hand side of Table 8).

5.2.7. Configuration of combined PVs and NVs for high and low scores of subjective well-being

Table 9 presents various configurations obtained from the truth table analysis for high and low scores of subjective well-being using PVs and NVs as the combined antecedents. For the high score of well-being (shown on the left-hand side of Table 9), five configurations were obtained, with overall solution consistency and coverage of 0.97 and 0.81. However, the first configuration (P1*P2*P3*P4*P5*P6*P7*P8*N1*N2*N3*N4) had acceptable consistency and coverage of 0.99 and 0.72, respectively. Interestingly, this was the same configuration as for customer engagement. This configuration included all eight PVs and four of the six NVs to facilitate the high score of well-being. Hence, the

Table 9
Configurations of PVs and NVs for high and low scores of subjective well-being.

Configurations of PVs and NVs for predicting a high score of well-being	RC	UC	C	Configurations of PVs and NVs for predicting a low score of well being	RC	UC	C
P1*P2*P3*P4*P5*P6*P7*P8*N1*N2*N3*N4	0.73	0.57	0.99	No configurations of PVs and NVs produced low scores of customer engagement			
P1*P2*P4*P5*P6*P7*P8*N1* ~ N3*N2* ~ N4* ~ N5* ~ N6	0.15	0.007	0.94				
and three other configurations with high consistency but very low raw coverage (between 0.15 and 0.18) Solution coverage: 0.81 Solution consistency: 0.97							

Notes: RC = Raw coverage, UC = Unique coverage, C = Consistency; P1 = convenience, P2 = excellence, P3 = status, P4 = enjoyment, P5 = personalization, P6 = control, P7 = novelty, P8 = relational benefit, N1 = effort, N4 = performance risk, N3 = security risk, N2 = privacy risk, N5 = financial risk, N6 = physical risk.

interaction of positive and negative values also led to higher well-being. As before, no configurations of combined PVs and NVs produced any low score for well-being (see the right-hand side of Table 9).

6. Discussion and implications

Building on the existing literature on perceived value, value typologies, and affordance theory, the present paper identifies combinations of affordances based on value recipes (different combinations of positive and negative value types) that facilitate customer engagement and subjective well-being in the context of the retail metaverse. The results contribute to the ongoing conceptual debate on factors affecting engagement in the metaverse (Dwivedi et al., 2023a), as they offer novel insights into the combinations and trade-offs between perceived benefits and costs that can affect customer engagement and well-being.

6.1. Analysis of the configurations and test of the propositions

According to affordance theory (Gibson, 1979), consumers engaging with retailers in the metaverse may be expecting different value from this engagement, as people can use the opportunities this technology affords them to achieve different goals (Hadi et al., 2024; Shin, 2022; Zuo and Shen, 2024). At the same time, several features and characteristics of the metaverse may result in negative affordances and negatively affect the perceived value, use, and adoption of the technology (Apostolidis et al., 2021). The difference in goals, perceived affordances, and perceived value can affect customer well-being and engagement (Ahn et al., 2024; Arya et al., 2023). In the current study, we have built on the existing metaverse literature and explored how different combinations of value types can affect (positively or negatively) customer engagement and subjective well-being. Based on affordance theory and Leroi-Werelds' (2019) customer value typologies, eight positive values (relational benefit, novelty, control, personalization, enjoyment, status, excellence, and convenience) and six negative values (financial risk, security risk, performance risk, privacy risk, effort required, and physical risk) were used to evaluate the affordances capable of affecting customer engagement and subjective well-being in the retail metaverse context.

Contributing to existing literature, our empirical analysis combined affordance theory and value typologies, and by adopting an fsQCA approach, we identified a number of affordance combinations (revealed through the different value recipes) capable of supporting high customer engagement and subjective well-being in the retail metaverse context. Firstly, the results revealed a configuration of positive affordances capable of predicting high customer engagement and subjective well-being. In line with earlier metaverse studies that highlighted the importance of factors like personalisation opportunities and gamification (e.g., Ahn et al., 2024; Arya et al., 2023; Dwivedi et al., 2023a), in our study, metaverse-related benefits included convenience (P1), excellence (P2), enjoyment (P4), personalization (P5), control (P6), novelty (P7), and relational benefits (P8). On the other hand, despite earlier studies highlighting status-building as one of the drivers behind people's engagement with the metaverse (Dwivedi et al., 2023a; Arya et al., 2023), status (P3) did not feature as one of the positive values in our configuration.

Interestingly, a configuration of negative values including effort (N1), privacy risk (N2), security risk (N3), and performance risk (N4) also predicted high customer engagement and subjective well-being, despite the negative direction of two of the NVs (N3 and N4). This paradoxical finding contradicts the findings of earlier studies that highlighted the negative impact of risk on metaverse engagement (Oleksy et al., 2023), and showcases the importance of taking into consideration the combinations and trade-offs of positive and negative affordances when exploring consumers' engagement with new technologies, as the effect of negative affordances may not be absolute but can be compensated through the positive affordances a technology offers. On the other hand, NVs like financial risk (N5) and physical risk (N6) did not seem to affect engagement and subjective well-being. Further, no configurations of PVs and NVs were found to produce low scores of the outcome variables: this finding offers interesting insights regarding the impact of positive and negative metaverse affordances on engagement and well-being.

A novel contribution of this research is the use of value typologies as an approach to evaluate both positive and negative metaverse affordances and the consideration of the combined effect and trade-offs of positive and negative affordances, in the form of value types, on customer engagement and well-being. According to our analysis, a combination of PVs and NVs produced high scores for both of our measured outcomes, which indicates that similar combinations of perceived affordances affect customer engagement and well-being in the retail metaverse. This finding supports Proposition 1, which suggested that both positive and negative values are prerequisite conditions for a metaverse value recipe, in order to predict customer engagement and well-being in a retail metaverse setting.

The results also showed that one combination of perceived affordances could effectively predict the different outcome variables in this study. This implies that one value recipe consisting of positive and negative values (convenience, excellence, status, personalization, control, novelty, and relational benefits) can effectively influence two different outcome variables, namely customer engagement and subjective well-being, in the retail metaverse context. This rejects Proposition 2, in which we proposed that there would be different value recipes for different outcomes, and offers interesting insights for both academics and practitioners. Although we anticipated, based on existing literature, that different value recipes would influence these outcome variables, our findings suggest that by combining and managing the identified perceived affordances, organisations and practitioners can support both customer well-being and engagement with the metaverse. This essentially endorses the updated value typology proposed by Leroi-Werelds (2019) and validates the claim that the typology can be generalised, covering a wide array of value sources that can influence distinct customer-centric contexts. To the best of our knowledge, this is the first study to combine affordance theory and Leroi-Werelds' (2019) value typology through the use of a QCA methodology, and thus our findings also offer several theoretical and practical contributions, which will be discussed in the next section.

6.2. Theoretical implications

Several recent studies on technology use and adoption have adopted an affordance theory lens to explore the properties and capabilities of technologies that enable users to perform certain tasks to achieve their goals (e.g., Apostolidis et al., 2021; Lin and Kishore, 2021; Shin, 2022; Shao et al., 2024). This research extends prior technology affordance studies by utilising value typologies to explore the perceived value that these affordances can create, and how this affects customer engagement and well-being. The identification of different value recipes demonstrates how the same technology can offer different opportunities and value for different consumers. Additionally, our research adopts an fsQCA methodology to empirically support the necessity of adopting the evolved conceptualisation of customer perceived value, considering the combinations and trade-offs between (positive and negative) affordances, especially for technology-mediated contexts like the metaverse, thus generalizing its theoretical conceptualisation.

In addition, the literature has advocated the role of customer-perceived value in explaining customer engagement (Hollebeek et al., 2019; Zeithaml et al., 2020). However, the literature is scarce in the context of the metaverse (Dwivedi et al., 2023a, 2023b; Ghali et al., 2024; Wongkitrungrueng and Suprawan, 2023). This study is one of the first to assess customer engagement in relation to perceived value and the perceived value types. Specifically, our results add to the ongoing debate in the literature that examined the relationship between selected (individual) positive components of customer perceived value (utilitarian, hedonic, symbolic) and customer engagement. The existing results confirmed that only symbolic value (not utilitarian and hedonic) has a moderate positive relationship with customer engagement (Wongkitrungrueng and Suprawan, 2023). Since individual value types have complex trade-off effects, only certain combinations of value types unveil the complex relationships. The present study deviated and conceptualized value recipes as multiple, distinct combinations of positive and negative values capable of predicting customer engagement in the retail metaverse context. This contributes to the existing literature by empirically validating the simultaneous impact of different combinations of positive and negative value types on customer engagement with the metaverse. The adoption of value typologies and the focus on value recipes is a welcome addition to the affordance theory literature (Roy et al., 2023) and offers an interesting theoretical lens for future studies exploring technology affordances. Moreover, the literature is also concentrated toward determining the direct relationship between selected factors and subjective well-being (Aboelmaged et al., 2021) in technology-centric contexts. We further extend this literature by considering the trade-offs between different positive and negative affordances/value types and determining their simultaneous positive impacts on subjective well-being. Contributing to the affordance theory literature, our fsQCA results reveal that the combination of positive and negative values enhances customer engagement and well-being, which allows for a nuanced understanding of how various affordances (and their combinations) contribute to the outcome of interest. In our analysis, we found that when all PVs are present in a configuration (a necessary condition in our case), they can be combined with some NVs and produce high scores for both engagement and well-being (i.e., a sufficient condition). This novel approach helps to uncover the complexity of real-world phenomena and provides valuable insights for academics and researchers interested in metaverse affordances and the adoption of metaverse technologies in the retail sector. Overall, our findings respond to the calls for further advancing empirical research on customer engagement and subjective well-being in the retail metaverse context (Dwivedi et al., 2023a).

6.3. Managerial implications

From a practical point of view, the results offer guidelines for successfully supporting the metaverse in retailing (Meißner et al., 2020). Retailers considering the use of the metaverse can closely examine the combinations of value types uncovered in this study to inform their metaverse retail strategy. For example, it is evident from this research that customer engagement and subjective well-being are realised when customers perceive the metaverse as fulfilling the needs of convenience, enjoyment, personalisation, excellence, control, and novelty. This implies that retailers should design their metaverse with the aim of making it easier for customers to transact and interact in this technology-centric environment. In addition, the design of the retail metaverse should be such that customers find novelty in its use and obtain enjoyment from using it. Furthermore, customers should be able to tailor the metaverse environment to their needs and have control over their purchase and consumption process.

In terms of the negative value types, retailers should emphasise making the metaverse environment easier to use, requiring less effort. In addition, they should focus on reducing perceived risks in aspects of privacy, security, and performance. Managing these aspects in the design of the retail metaverse will lead to higher customer engagement and subjective well-being. Interestingly, financial and physical risks were not found to impede customer engagement and subjective well-being. This could be because financial risk only arises when customers transact and are able to compare prices. Given the presented scenario, the respondents may not have considered financial risk as a key determinant for customer engagement and subjective well-being. In addition, it is expected that there will be a lack of physical risk in a virtual environment like the metaverse because it is the avatars that interact with each other, rather than actual persons.

Finally, the interplay between customer-perceived positive and negative values in augmenting customer engagement and subjective well-being offers exciting insights for retailers who wish to make the most of their investments in the metaverse. The presence of both positive and negative values in a recipe reflects the complexity of real-world dynamics. Customer engagement and well-being are not driven by purely positive factors; instead, a combination of supportive and challenging conditions interacts to produce the desired outcome. The combination of negative values alongside positive ones in a recipe teaches retail organisations that some negative conditions do not necessarily prevent success in using the metaverse successfully. Organisations can build flexible systems that accommodate certain challenges while maintaining strong overall customer engagement and well-being. This means learning to adapt strategies dynamically in response to shifting market or customer conditions. Retail organisations can design customized interventions, knowing that a balance of conditions is needed. For instance, even if customers experience some negative factors, such as privacy or performance concerns, addressing these concerns with personalized offers or superior user experience can still result in positive engagement. Different customer segments may also respond differently to various positive and negative values, meaning that the recipe for high engagement and well-being may vary.

Specifically, the results obtained from a combination of positive and negative values imply that retailers need to nurture significant positive values to produce high scores for the outcome variables. Moreover, retailers need to manage these negative values well, as mitigating them will result in high scores for the outcome variables. In summary, our results confirm the need for retailers to better understand their customers' perceived value configurations in designing a retail metaverse that will potentially facilitate greater customer engagement and enhance their subjective well-being.

6.4. Limitations and future research directions

Despite the abovementioned contributions, the study has some limitations. First, the data was captured from a single country, namely Australia, rendering our results highly country-specific. Although the metaverse offers a boundless virtual world, accessible to anyone across the globe, the literature advocates that customers' cultural values, cross-cultural aspects, and factors that influence customer decision-making should be investigated in the metaverse context (Gursoy et al., 2022; Mkedder and Das, 2024). Thus, future research should consider how cultural background influences customer-perceived values from the metaverse and impacts engagement and subjective well-being. Secondly, this study adapted Leroi-Werelds' (2019) value typology (positive vs. negative) as the ingredients to determine a value recipe that effectively explained customer engagement and subjective well-being in a metaverse context. This typology is grounded in the positivist paradigm of customer-perceived value (Zeithaml et al., 2020). Future research may adopt similar studies using value typologies from other paradigms, such as interpretivism (Zeithaml et al., 2020), to conceptualise customer-perceived value. Such focused efforts will enable future researchers to identify commonalities (vs. deviations) in developing customer engagement and subjective well-being in the metaverse context. Third, the customer perception of the metaverse, its role in generating customer engagement, and its impact on subjective well-being were captured during the pandemic. It is highly likely that the pandemic has altered customers' perceptions of the metaverse. Future studies may examine how situational and psychological factors linked with the pandemic have changed customer-perceived values toward the metaverse and its impact on customer engagement and subjective well-being.

CRediT authorship contribution statement

Gaganpreet Singh: Writing – review & editing, Writing – original draft, Visualization, Project administration, Methodology, Investigation, Data curation, Conceptualization. **Sanjit K. Roy:** Writing – review & editing, Writing – original draft, Visualization, Supervision, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Chrysostomos Apostolidis:** Writing – review & editing, Writing – original draft, Project administration, Methodology, Conceptualization. **Mohammed Quaddus:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Conceptualization. **Saalem Sadeque:** Writing – review & editing, Writing – original draft, Investigation, Conceptualization.

Appendix A. Description of the metaverse (adapted from Zhang et al., 2023)

The term 'Metaverse' has its roots attached to the science fiction novel 'Snow Crash.' In the story, a virtual world is showcased that can be connected with the physical world to facilitate the creation of a new social system. With the help of new-age technologies, businesses are introducing their Metaverse solutions as a business strategy.

Imagine you are accessing a Metaverse shopping application of the retailer called 'Metaapp.' The Metaverse environment created by the retailer through new-age technologies enables your avatar to navigate inside the shopping arena and shop naturally and intuitively. The 3D immersive environment allows you to interact compellingly with fellow customers, front-line employees and their brands. It offers you a plethora of information about the brand, product and other essential facts of the customer decision-making journey. You can enter a more detailed product store and purchase immediately by clicking through a specific store icon.

Appendix B. Constructs adopted in the research

Constructs	Value types (source)	Measurement items
Metaverse Benefits (Positive values)	Convenience (Pihlström and Brush, 2008)	I would save time and money in the metaverse (C1). I value the ease of shopping in the metaverse (C2). I value the option of shopping instantly in the metaverse (C3). Shopping in the metaverse makes my life easier (C4). Shopping in the metaverse is an efficient way to manage my time (C5). I value shopping in the metaverse without others noticing (C6).
	Excellence (Cronin et al., 2000; Gallarza et al., 2017)	Metaverse provides service reliably, consistently, and dependably (E1). Metaverse provides service promptly (E2). Metaverse is competent (i.e., knowledgeable and skilful) (E3). Metaverse is approachable and easy to contact (E4). Metaverse is courteous, polite, and respectful (E5).
	Status (Nasution and Mavondo, 2008)	Shopping in the metaverse is prestigious (S1). I consider shopping in the metaverse a status symbol (S2). I consider shopping in the metaverse to fit my social status (S3). Shopping in the metaverse conveys a good impression to other people (S4).
	Enjoyment (Gallarza et al., 2017)	The activities organized in the metaverse are great fun (EN1). Metaverse offers added services to make my shopping more pleasurable (EN2). Metaverse offers added services to make my shopping more comfortable (EN3).
	Personalization (Veloutsou and McAlonan, 2012)	Shopping in the metaverse addresses each customer's specific needs (P1). Shopping in the metaverse can be personalized to my needs (P2). Metaverse offers customized responses for shopping-related questions (P3). Interacting on the metaverse screen with adequate(beneficial) results being returned is possible (P4).
	Control (Kleijnen et al., 2007)	Metaverse allows me to make a lot of decisions on my own (CT1). I have much to say about shopping in the metaverse (CT2). Metaverse offers flexibility in shopping (CT3). Metaverse allows control over shopping transactions (CT4).
	Novelty (Wells et al., 2010)	Metaverse is new (NO1). Metaverse is unique (NO2). Metaverse is original (NO3).
	Relational benefits (Chan et al., 2010)	Shopping in the metaverse helps me build a better relationship (R1). Metaverse makes service interactions more enjoyable (R2). My participation helps me receive relational approval from the Metaverse (R3).

(continued on next page)

(*continued*)

Constructs	Value types (source)	Measurement items
Metaverse Costs (Negative values)	Effort (Mani and Chouk, 2018)	Learning to use Metaverse for shopping is easy for me (EF1). Metaverse is easy to use (EF2). Getting the results I desire from Metaverse is easy (EF3).
	Security risk (Mani and Chouk, 2018)	The risk of an unauthorized third party overseeing the payment process at Metaverse is high (S1). The risk of abuse of billing information (e.g., credit card number, bank account data) is high when using Metaverse (S2). The risk of abuse of information (e.g., credit card number, bank account data) is high when using metaverse (S3).
	Privacy risk (Lin et al., 2005)	I feel like my privacy is protected in Metaverse (PV1). I feel safe in transactions while shopping in the metaverse (PV2). Metaverse has adequate security features (PV3).
	Performance risk (Kleijnen et al., 2007)	In the metaverse, I worry about whether the service will perform as well as it should (PR1). Using metaverse causes me to be concerned about how reliable the service will be (PR2). If I were to use Metaverse, I would be concerned that the service does not provide my expected level of benefits (PR3). Using metaverse makes me concerned about how dependable the service will be (PR4).
	Financial risk (Forsythe et al., 2006)	I can't trust Metaverse for making financial transactions (F1). I may not get value for money in metaverse (F2). I may purchase something by accident in Metaverse (F3). My personal information may not be kept in the metaverse (F4). I may not get what I want in Metaverse (F5). My credit card number may not be secure in Metaverse (F6). I might be overcharged in metaverse (F7).
	Physical risk (Mani and Chouk, 2018)	Using the metaverse involves risks to my health (PH1). Metaverse involves risks for its users' health (PH2). I think the radiation emitted by the devices in the metaverse harms my health (PH3).
Customer Engagement	Cognitive engagement (Hollebeek et al., 2014)	Shopping at metaverse gets me to think about metaverse (COG1). I often think about the metaverse when shopping in the metaverse (COG2). Shopping in the metaverse stimulates my interest in learning more about the metaverse (COG3).
	Affective engagement (Hollebeek et al., 2014)	Using metaverse makes me happy (AFF1). I feel good when I use Metaverse (AFF2). I am proud to use Metaverse (AFF3). I feel very positive when I use Metaverse (AFF4).
Subjective Well-being	(Diener and Emmons, 1984; Gallan et al., 2019)	In general, I consider myself a happy person (SWB1) Compared to most of my peers, I consider myself happier (SWB2) I am generally very happy and enjoy life (SWB 3)

Appendix C. Truth tables

Table 10
Truth table of positive values leading to customer engagement.

Convenience	Excellence	Status	Enjoyment	Personalisation	Control	Novelty	Relational benefit	% cases	raw consist.	PRI consist.	SYM consist
1	1	1	1	1	1	1	1	90.77	0.994716	0.993961	0.999393
1	1	0	1	1	1	1	1	3.68	0.993404	0.981454	0.986577
0	0	0	0	0	0	0	0	1.11	0.879429	0.303978	0.333334
0	0	0	0	0	0	1	0	1.11	0.881657	0.269662	0.269662
0	0	1	0	0	0	1	0	0.37	0.96732	0.608433	0.608432
1	1	1	1	0	1	1	0	0.37	0.998829	0.992629	0.992629
1	1	0	0	1	1	1	0	0.37	0.986529	0.88779	0.896665
1	1	1	0	1	1	1	0	0.37	0.998198	0.98992	0.98992
1	1	0	1	1	1	1	0	0.37	0.983375	0.906313	0.906313
0	1	1	1	0	0	1	1	0.37	0.998624	0.985981	0.985982
1	1	0	1	1	0	1	1	0.37	0.981111	0.876237	0.876236
0	1	1	0	1	1	1	1	0.37	0.998705	0.989619	0.989618
1	1	1	0	1	1	1	1	0.37	0.999078	0.996491	0.996491

Table 11
Truth table of negative values leading to customer engagement.

Effort	Security	Privacy	Performance risk	Financial risk	Physical risk	% cases	raw consist.	PRI consist.	SYM consist
1	1	1	1	1	1	72.33	0.99698	0.996513	0.998254
1	0	1	0	0	0	6.72	0.999071	0.998193	0.999096
1	1	0	1	1	0	3.91	0.970912	0.917269	0.936833
1	0	1	1	0	0	3.48	0.99947	0.998711	0.998711
1	1	1	1	0	1	2.66	1	1	1
1	1	1	1	0	0	1.48	0.995778	0.989123	0.989123

(*continued on next page*)

Table 11 (*continued*)

Effort	Security	Privacy	Performance risk	Financial risk	Physical risk	% cases	raw consist.	PRI consist.	SYM consist
1	1	1	1	1	0	1.18	0.989786	0.972881	0.972881
1	0	1	1	1	0	0.79	0.998523	0.995656	0.998258
1	1	1	0	1	0	0.79	0.99486	0.98072	0.98072
0	0	0	0	0	0	0.79	0.948468	0.606386	0.650191
0	1	0	1	1	0	0.79	0.93407	0.661052	0.661052
0	1	0	1	1	1	0.79	0.92851	0.646809	0.646809
0	1	1	0	0	1	0.39	1	1	1
1	1	1	0	0	1	0.39	1	1	1
0	0	0	0	1	0	0.39	0.99902	0.990476	0.990476
1	0	1	1	1	1	0.39	0.998293	0.994511	0.994511
1	1	0	1	1	1	0.39	0.99789	0.992386	0.992386
1	0	0	1	0	1	0.39	0.99768	0.982699	1
1	1	1	0	0	0	0.39	0.995015	0.983606	0.983606
0	0	1	1	0	0	0.39	0.994045	0.948819	0.975708
0	0	0	1	0	1	0.39	0.993299	0.925286	0.952663
1	0	1	0	0	1	0.39	0.991289	0.948718	0.948718
1	0	1	1	0	1	0.39	0.988794	0.954616	0.954616

Table 12
Truth table of positive values leading to subjective well-being.

Convenience	Excellence	Status	Enjoyment	Personalisation	Control	Novelty	Relational benefit	% cases	raw consist.	PRI consist.	SYM consist
1	1	1	1	1	1	1	1	90.77	0.968782	0.9645	0.971162
1	1	0	1	1	1	1	1	3.7	0.910027	0.788594	0.788592
0	0	0	0	0	0	1	0	1.1	0.960401	0.817228	0.817227
0	0	0	0	0	0	0	0	1.1	0.949311	0.774123	0.805936
0	0	1	0	0	0	1	0	0.37	0.97989	0.867989	0.867987
1	1	1	1	0	1	1	0	0.37	0.959423	0.826955	0.826955
1	1	0	0	1	1	1	0	0.37	0.948494	0.779661	0.779661
1	1	1	0	1	1	1	0	0.37	0.952776	0.813391	0.813391
1	1	0	1	1	1	1	0	0.37	0.946512	0.805263	0.805263
0	1	1	1	0	0	1	1	0.37	0.971573	0.831521	0.831522
1	1	0	1	1	0	1	1	0.37	0.959955	0.822743	0.835314
0	1	1	0	1	1	1	1	0.37	0.96373	0.825726	0.825727
1	1	1	0	1	1	1	1	0.37	0.957257	0.866858	0.866858

Data availability

Data will be made available on request.

References

Aboelmaged, M., Hashem, G., Mouakket, S., 2021. Predicting subjective well-being among mHealth users: a readiness–value model. Int. J. Inf. Manag. 56, 102247.

Ahn, S., Jin, B.E., Seo, H., 2024. Why do people interact and buy in the Metaverse? Self-expansion perspectives and the impact of hedonic adaptation. J. Bus. Res. 175, 114557.

Anderson, C., Robey, D., 2017. Affordance potency: explaining the actualization of technology affordances. Inf. Organ. 27 (2), 100–115.

Apostolidis, C., Brown, D., Wijetunga, D., Kathriarachchi, E., 2021. Sustainable value co-creation at the bottom of the pyramid: using mobile applications to reduce food waste and improve food security. J. Mark. Manag. 37 (9–10), 856–886.

Arya, V., Sambyal, R., Sharma, A., Dwivedi, Y.K., 2023. Brands are calling your AVATAR in Metaverse–a study to explore XR-based gamification marketing activities & consumer-based brand equity in virtual world. J. Consum. Behav. 23 (2), 556–585.

Bao, W., Hudders, L., Yu, S., Beuckels, E., 2024. Virtual luxury in the metaverse: NFT-enabled value recreation in luxury brands. Int. J. Res. Mark. https://doi.org/10.1016/j.ijresmar.2024.01.002 (in Press).

Barrera, K.G., Shah, D., 2023. Marketing in the metaverse: conceptual understanding, framework, and research agenda. J. Bus. Res. 155, 113420.

Belk, R., Humayun, M., Brouard, M., 2022. Money, possessions, and ownership in the Metaverse: NFTs, cryptocurrencies, Web3 and wild markets. J. Bus. Res. 153, 198–205.

Briki, W., 2019. Harmed trait self-control: why do people with a higher dispositional malicious envy experience lower subjective wellbeing? A cross-sectional study. J. Happiness Stud. 20 (2), 523–540.

Brodie, R.J., Hollebeek, L.D., Jurić, B., Ilić, A., 2011. Customer engagement: conceptual domain, fundamental propositions, and implications for research. J. Serv. Res. 14 (3), 252–271.

Buhalis, D., Lin, M.S., Leung, D., 2022. Metaverse as a driver for customer experience and value co-creation: implications for hospitality and tourism management and marketing. Int. J. Contemp. Hosp. Manag. 35 (2), 701–716.

Cameron, I., 2021. Nike Makes First Foray into Metaverse with 'Nikeland'on Roblox. Retrieved on March, 14, 2022.

Chan, K.W., Yim, C.K., Lam, S.S., 2010. Is customer participation in value creation a double-edged sword? Evidence from professional financial services across cultures. J. Mark. 74 (3), 48–64.

Cronin Jr., J., Brady, M.K., Hult, G., 2000. Assessing the effects of quality, value, and customer satisfaction on consumer behavioural intentions in service environments. J. Retail. 76 (2), 193–218.

Diener, E., Emmons, R.A., 1984. The independence of positive and negative affect. J. Pers. Soc. Psychol. 47 (5), 1105.

Dwivedi, Y.K., Hughes, L., Baabdullah, A.M., Ribeiro-Navarrete, S., Giannakis, M., Al-Debei, M.M., et al., 2022. Metaverse beyond the hype: multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. Int. J. Inf. Manag. 66, 102542.

Dwivedi, Y.K., Hughes, L., Wang, Y., Alalwan, A.A., Ahn, S.J., Balakrishnan, J., et al., 2023a. Metaverse marketing: how the metaverse will shape the future of consumer research and practice. Psychol. Mark. 40 (4), 750–776.

Dwivedi, Y.K., Kshetri, N., Hughes, L., Rana, N.P., Baabdullah, A.M., Kar, A.K., et al., 2023b. Exploring the Darkverse: a multi-perspective analysis of the negative societal impacts of the metaverse. Inf. Syst. Front. 25, 1–44.

Engås, K.G., Raja, J.Z., Neufang, I.F., 2023. Decoding technological frames: an exploratory study of access to and meaningful engagement with digital technologies in agriculture. Technol. Forecast. Soc. Change 190, 122405.

Fliess, S., Nadzeika, A., Nesper, J., 2012. Understanding patterns of customer engagement–how companies can gain a surplus from a social phenomenon. J. Mark. Dev. Compet. 6 (2), 81–92.

Fornell, C., Larcker, D.F., 1981. Structural equation models with unobservable variables and measurement error: algebra and statistics. J. Market. Res. 18 (3), 382–388.

Forsythe, S., Liu, C., Shannon, D., Gardner, L.C., 2006. Development of a scale to measure the perceived benefits and risks of online shopping. J. Interact. Mark. 20 (2), 55–75.

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.

Gallan, A.S., McColl-Kennedy, J.R., Barakshina, T., Figueiredo, B., Jefferies, J.G., Gollnhofer, J., Hibbert, S., Luca, N., Roy, S., Spanjol, J., Winklhofer, H., 2019. Transforming community well-being through patients' lived experiences. J. Bus. Res. 100, 376–391.
Gallarza, M.G., Arteaga, F., Del Chiappa, G., Gil-Saura, I., Holbrook, M.B., 2017. A multidimensional service-value scale based on Holbrook's typology of customer value: bridging the gap between the concept and its measurement. J. Serv. Manag. 28 (4), 724–762.
Ghali, Z., Rather, R.A., Khan, I., 2024. Investigating metaverse marketing-enabled consumers' social presence, attachment, engagement and (re)visit intentions. J. Retail. Consum. Serv. 77, 103671.
Gibson, J.J., 1979. The Theory of Affordances. Houghton Mifflin, Boston.
Gleim, M., McCullough, H., Ferrell, O.C., Gabler, C., 2024. Metaverse: shifting the reality of services. J. Serv. Mark. 38 (1), 13–27.
Gligor, D., Bozkurt, S., 2020. FsQCA versus regression: the context of customer engagement. J. Retail. Consum. Serv. 52, 101929.
Glover, D., 2022. Affordances and agricultural technology. J. Rural. Stud. 94, 73–82.
Gursoy, D., Malodia, S., Dhir, A., 2022. The metaverse in the hospitality and tourism industry: an overview of current trends and future research directions. J. Hosp. Market. Manag. 31 (5), 527–534.
Hadi, R., Melumad, S., Park, E.S., 2024. The Metaverse: a new digital frontier for consumer behaviour. J. Consum. Psychol. 34 (1), 142.
Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E., Tatham, R., 2010. Multivariate Data Analysis, 7th ed. Pearson Prentice Hall, New York.
Hennig-Thurau, T., Aliman, D.N., Herting, A.M., Cziehso, G.P., Linder, M., Kübler, R.V., 2023. Social interactions in the metaverse: framework, initial evidence, and research roadmap. J. Acad. Mark. Sci. 51 (4), 889–913.
Higgins, E.T., Scholer, A.A., 2009. Engaging the consumer: the science and art of the value creation process. J. Consum. Psychol. 19 (2), 100–114.
Holbrook, M., 1996. Customer value: a framework for analysis and research. In: Corfman, K.P., Lynch Jr., J.G. (Eds.), NA–Advances in Consumer Research, vol. 23. Association for Consumer Research, Provo, UT, pp. 138–142.
Holbrook, M. (Ed.), 1999. Consumer Value: A Framework for Analysis and Research. Psychology Press, London.
Hollebeek, L.D., Chen, T., 2014. Exploring positively-versus negatively-valenced brand engagement: a conceptual model. J. Prod. Brand Manag. 23 (1), 62–74.
Hollebeek, L.D., Glynn, M.S., Brodie, R.J., 2014. Consumer brand engagement in social media: conceptualization, scale development and validation. J. Interact. Mark. 28 (2), 149–165.
Hollebeek, L.D., Sprott, D.E., Andreassen, T.W., Costley, C., Klaus, P., Kuppelwieser, V., et al., 2019. Customer engagement in evolving technological environments: synopsis and guiding propositions. Eur. J. Mark. 53 (9), 2018–2023.
Homans, G.C., 1958. Social behaviour as exchange. Am. J. Sociol. 63 (6), 597–606.
Hu, L.T., Bentler, P.M., 1999. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. Struct. Equ. Model. Multidiscip. J. 6 (1), 1–55.
Itani, O.S., Kassar, A.N., Loureiro, S.M.C., 2019. Value get, value give: the relationships among perceived value, relationship quality, customer engagement, and value consciousness. Int. J. Hosp. Manag. 80, 78–90.
James, D., 2022. How retailers are connecting the metaverse to the real world and revenue. In: RetainDive. https://www.retaildive.com/news/retailers-connecting-metaverse-roblox-real-world-revenue/636209/.
Jo, H., 2023. Tourism in the digital frontier: a study on user continuance intention in the metaverse. Inf. Technol. Tour. 25 (3), 1–24.
Kang, J., 2020. Identifying antecedents and consequences of well-being: the case of cruise passengers. Tour. Manag. Perspect. 33, 100609.
Kleijnen, M., De Ruyter, K., Wetzels, M., 2007. An assessment of value creation in mobile service delivery and the moderating role of time consciousness. J. Retail. 83 (1), 33–46.
Koohang, A., Nord, J.H., Ooi, K.B., Tan, G.W.H., Al-Emran, M., Aw, E.C.X., et al., 2023. Shaping the metaverse into reality: a holistic multidisciplinary understanding of opportunities, challenges, and avenues for future investigation. J. Comput. Inf. Syst. 63 (3), 735–765.
Kumar, A., Shankar, A., Shaik, A.S., Jain, G., Malibari, A., 2023. Risking it all in the Metaverse Ecosystem: Forecasting Resistance towards the Enterprise Metaverse, Preprint. Information Technology & People. https://doi.org/10.1108/ITP-04-2023-0374.
Kumar, V., Rajan, B., Gupta, S., Pozza, I.D., 2019. Customer engagement in service. J. Acad. Mark. Sci. 47, 138–160.
Kumar, V., Ramachandran, D., Kumar, B., 2021. Influence of new-age technologies on marketing: a research agenda. J. Bus. Res. 125, 864–877.
Lee, C.T., Shen, Y.C., Li, Z., Xie, H.H., 2024. The effects of non-fungible token platform affordances on customer loyalty: a Buyer–Creator duality perspective. Comput. Hum. Behav. 151, 108013.
Lei, S.I., Wang, D., Law, R., 2019. Perceived technology affordance and value of hotel mobile apps: a comparison of hoteliers and customers. J. Hosp. Tour. Manag. 39, 201–211.
Leonardi, P.M., 2011. When flexible routines meet flexible technologies: affordance, constraint, and the imbrication of human and material agencies. MIS Q. 35 (1), 147–167.
Leroi-Werelds, S., 2019. An update on customer value: state of the art, revised typology, and research agenda. J. Serv. Manag. 30 (5), 650–680.
Leung, X.Y., Zhang, H., Lyu, J., Bai, B., 2023. Why do hotel frontline employees use service robots in the workplace? A technology affordance theory perspective. Int. J. Hosp. Manag. 108, 103380.
Lewellyn, K.B., Muller-Kahle, M.I., 2022. A configurational exploration of how female and male CEOs influence their compensation. J. Manag. 48 (7), 2031–2074.
Lin, C., Sher, P., Shih, H., 2005. Past progress and future directions in conceptualizing customer perceived value. Int. J. Serv. Ind. Manag. 16 (4), 318–336.
Lin, X., Kishore, R., 2021. Social media-enabled healthcare: a conceptual model of social media affordances, online social support, and health behaviors and outcomes. Technol. Forecast. Soc. Change 166, 120574.
Lindell, M.K., Whitney, D.J., 2001. Accounting for common method variance in cross-sectional research designs. J. Appl. Psychol. 86 (1), 114–121.
Mani, Z., Chouk, I., 2018. Consumer resistance to innovation in services: challenges and barriers in the internet of things era. J. Prod. Innov. Manag. 35 (5), 780–807.
Marr, B., 2022. Gucci enters the Metaverse. In: Forbes, November 30, 2022. https://www.forbes.com/sites/bernardmarr/2022/11/30/gucci-enters-the-metaverse/?sh=71bc452a1d66.
Meißner, M., Pfeiffer, J., Peukert, C., Dietrich, H., Pfeiffer, T., 2020. How virtual reality affects consumer choice. J. Bus. Res. 117, 219–231.
Misangyi, V.F., Acharya, A.G., 2014. Substitutes or complements? A configurational examination of corporate governance mechanisms. Acad. Manage. J. 57 (6), 1681–1705.
Misangyi, V.F., Greckhamer, T., Furnari, S., Fiss, P.C., Crilly, D., Aguilera, R., 2017. Embracing causal complexity: the emergence of a neo-configurational perspective. J. Manag. 43 (1), 255–282.
Mkedder, N., Das, M., 2024. Metaverse integration challenges: an in-depth ISM and MICMAC analysis. J. Retail. Consum. Serv. 77, 103684.
Muhammad, S.S., Dey, B.L., Kamal, M.M., Alwi, S.F.S., 2021. Consumer engagement with social media platforms: a study of the influence of attitudinal components on cutting edge technology adaptation behaviour. Comput. Hum. Behav. 121, 106802.
Nair, L.B., Gibbert, M., 2016. Analyzing inconsistent cases in management fsQCA studies: a methodological manifesto. J. Bus. Res. 69 (4), 1464–1470.
Nasution, H.N., Mavondo, F.T., 2008. Customer value in the hotel industry: what managers believe they deliver and what customer experience. Int. J. Hosp. Manag. 27 (2), 204–213.
Neuhofer, B., Buhalis, D., Ladkin, A., 2015. Smart technologies for personalized experiences: a case study in the hospitality domain. Electron. Mark. 25, 243–254.
Ning, H., Wang, H., Lin, Y., Wang, W., Dhelim, S., Farha, F., et al., 2023. A survey on the metaverse: the state-of-the-art, technologies, applications, and challenges. IEEE Internet Things J. 10 (16), 14671–14688.
Oh, H.J., Kim, J., Chang, J.J., Park, N., Lee, S., 2023. Social benefits of living in the metaverse: the relationships among social presence, supportive interaction, social self-efficacy, and feelings of loneliness. Comput. Hum. Behav. 139, 107498.
Oleksy, T., Wnuk, A., Piskorska, M., 2023. Migration to the metaverse and its predictors: attachment to virtual places and metaverse-related threat. Comput. Hum. Behav. 141, 107642.
Olya, H.G., Altinay Gazi, Z., Altinay Aksal, F., Altinay, M., 2018. Behavioural intentions of disabled tourists for the use of peer-to-peer accommodations: an application of fsQCA. Int. J. Contemp. Hosp. Manag. 30 (1), 436–454.
Ordanini, A., Parasuraman, A., Rubera, G., 2014. When the recipe is more important than the ingredients: a qualitative comparative analysis (QCA) of service innovation configurations. J. Serv. Res. 17 (2), 134–149.
Pansari, A., Kumar, V., 2017. Customer engagement: the construct, antecedents, and consequences. J. Acad. Mark. Sci. 45, 294–311.
Papagiannidis, S., Pantano, E., See-To, E.W., Dennis, C., Bourlakis, M., 2017. To immerse or not? Experimenting with two virtual retail environments. Inf. Technol. People 30 (1), 163–188.
Pappas, I.O., Woodside, A.G., 2021. Fuzzy-set qualitative comparative analysis (fsQCA): guidelines for research practice in information systems and marketing. Int. J. Inf. Manag. 58, 102310.
Park, S.M., Kim, Y.G., 2022. A metaverse: taxonomy, components, applications, and open challenges. IEEE Access 10, 4209–4251.
Pihlström, M., Brush, G., 2008. Comparing the perceived value of information and entertainment mobile services. Psychol. Mark. 25 (8), 732–755.
Podsakoff, P.M., Podsakoff, N.P., Williams, L.J., Huang, C., Yang, J., 2024. Common method bias: It's bad, it's complex, it's widespread, and it's not easy to fix. Annu. Rev. Organ. Psychol. Organ. Behav. 11 (1), 17–61.
Prentice, C., Loureiro, S.M.C., 2018. Consumer-based approach to customer engagement–the case of luxury brands. J. Retail. Consum. Serv. 43, 325–332.
Ragin, C.C., 2008. Redesigning Social Inquiry: Fuzzy Sets and Beyond. University of Chicago Press, Chicago.
Ragin, C.C., 2009. Qualitative comparative analysis using fuzzy sets (fsQCA). In: Rihoux, B., Ragin, C. (Eds.), Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and Related Techniques. Sage, Thousand Oaks, pp. 87–121.
Rihoux, B., Ragin, C.C., 2008. Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and Related Techniques. Sage, Thousand Oaks.
Roy, S.K., Singh, G., Shabnam, S., 2021. Modelling customer engagement behaviour in smart retailing. Australas. J. Inf. Syst. 25, 1–30.
Roy, S.K., Singh, G., Gruner, R.L., Dey, B.L., Shabnam, S., Muhammad, S.S., Quaddus, M., 2023. Relationship quality in customer-service robot interactions in Industry 5.0: an analysis of value recipes. Inf. Syst. Front. 2023, 1–20.
Sánchez-Fernández, R., Iniesta-Bonillo, M.Á., Holbrook, M., 2009. The conceptualisation and measurement of consumer value in services. Int. J. Mark. Res. 51 (1), 1–17.
Schmitt, A.K., Grawe, A., Woodside, A.G., 2017. Illustrating the power of fsQCA in explaining paradoxical consumer environmental orientations. Psychol. Mark. 34 (3), 323–334.

Schöbel, S.M., Tingelhoff, F., 2023. Overcoming challenges to enable the potential of metaverse platforms: a qualitative approach to understand value creation. AIS Trans. Hum.-Comp. Interact. 15 (1), 1–21.
Schumacker, R.E., Lomax, R.G., 2004. A Beginner's Guide to Structural Equation Modelling. Psychology Press, London.
Seo, S., Lee, Y., 2008. Shopping values of clothing retailers perceived by consumers of different social classes. J. Retail. Consum. Serv. 15 (6), 491–499.
Shao, Z., Zhang, J., Zhang, L., Benitez, J., 2024. Uncovering post-adoption usage of AI-based voice assistants: a technology affordance lens using a mixed-methods approach. Eur. J. Inf. Syst. 1–27.
Sheth, J.N., Newman, B.I., Gross, B.L., 1991. Why we buy what we buy: a theory of consumption values. J. Bus. Res. 22 (2), 159–170.
Shin, D., 2022. The actualization of meta affordances: conceptualizing affordance actualization in the metaverse games. Comput. Hum. Behav. 133, 107292.
Strong, D.M., Volkoff, O., Johnson, S.A., Pelletier, L.R., Tulu, B., Bar-On, I., Trudel, J., Garber, L., 2014. A theory of organization-EHR affordance actualization. J. Assoc. Inf. Syst. 15 (2), 2.
Su, L., Swanson, S.R., Chen, X., 2016. The effects of perceived service quality on repurchase intentions and subjective well-being of Chinese tourists: the mediating role of relationship quality. Tour. Manag. 52, 82–95.
Suh, A., 2023. How users cognitively appraise and emotionally experience the metaverse: focusing on social virtual reality. Inf. Technol. People 37 (4), 1613–1641.
Sweeney, J., Soutar, G.N., 2001. Consumer perceived value: the development of a multiple item scale. J. Retail. 77 (2), 203–220.
Tombs, A.G., McColl-Kennedy, J.R., 2013. Third party customers infecting other customers for better or for worse. Psychol. Mark. 30 (3), 277–292.
Veloutsou, C., McAlonan, A., 2012. Loyalty and or disloyalty to a search engine: the case of young millennials. J. Consum. Mark. 29 (2), 125–135.
Wells, J.D., Campbell, D.E., Valacich, J.S., Featherman, M., 2010. The effect of perceived novelty on the adoption of information technology innovations: a risk/reward perspective. Decis. Sci. 41 (4), 813–843.
Wong, I.A., Lin, Z., Zhang, X., 2023. A techno-exchange engagement model of social media engagement: a social exchange and engagement theoretical synthesis. J. Vacat. Mark. 29 (3), 461–475.
Wongkitrungrueng, A., Suprawan, L., 2023. Metaverse meets branding: examining consumer responses to immersive brand experiences. Int. J. Hum.-Comp. Interact. 40 (11), 2905–2924.
Woodside, A.G., 2014. Embrace•perform•model: complexity theory, contrarian case analysis, and multiple realities. J. Bus. Res. 67 (12), 2495–2503.
Xi, N., Chen, J., Gama, F., Riar, M., Hamari, J., 2023. The challenges of entering the metaverse: an experiment on the effect of extended reality on workload. Inf. Syst. Front. 25 (2), 659–680.
Xie, L., Guan, X., He, Y., Huan, T.C., 2021. Wellness tourism: customer-perceived value on customer engagement. Tour. Rev. 77 (3), 859–876.
Yan, M., Filieri, R., Raguseo, E., Gorton, M., 2021. Mobile apps for healthy living: factors influencing continuance intention for health apps. Technol. Forecast. Soc. Change 166, 120644.
Yoo, K., Welden, R., Hewett, K., Haenlein, M., 2023. The merchants of meta: a research agenda to understand the future of retailing in the metaverse. J. Retail. 99 (2), 173–192.
Zeithaml, V.A., 1988. Consumer perceptions of price, quality, and value: a means-end model and synthesis of evidence. J. Mark. 52 (3), 2–22.
Zeithaml, V.A., Verleye, K., Hatak, I., Koller, M., Zauner, A., 2020. Three decades of customer value research: paradigmatic roots and future research avenues. J. Serv. Res. 23 (4), 409–432.
Zhang, L., Anjum, M.A., Wang, Y., 2023. The impact of trust-building mechanisms on purchase intention toward metaverse shopping: the moderating role of age. Int. J. Hum.-Comp. Interact. 40 (10), 1–19.
Zhang, S., Leidner, D., 2018. From improper to acceptable: how perpetrators neutralize workplace bullying behaviours in the cyber world. Inf. Manag. 55 (7), 850–865.
Zhang, Z., Li, H., Yang, Y., Xu, Y., 2021. Not all words are beneficial: the impact of management response contents on customer engagement behaviour. Int. J. Hosp. Manag. 93, 102805.
Zhou, Z., Chen, Z., Jin, X.L., 2024. A review of the literature on the metaverse: definition, technologies, and user behaviours. Internet Res. 34 (1), 129–148.
Zuo, M., Shen, Y., 2024. How features and affordances of a metaverse portal engage users? Evidence from exergames. Internet Res. 34 (1), 239–261.