Service design through the emotional mechanics of gamification and value co-creation: a user experience analysis

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SERVICE DESIGN THROUGH THE EMOTIONAL MECHANICS OF GAMIFICATION AND VALUE CO-CREATION: A USER EXPERIENCE ANALYSIS

Abstract

Service design is a practice-based discipline developed as a co-creative and human-centred view of service-dominant logic (S-D logic). In the literature, operationalisation of S-D logic requires integration with other approaches that encourage continued interactions with users through the evolution of the design process. The emotional mechanics of gamification can facilitate these interactions, creating a conducive environment for value co-creation. We address the problematization of service design and try to operationalize SD logic as a theoretical framework. The emotional mechanics of gamification and the value co-creation are antecedents of service design. The aim of this study is to analyse the impact of the emotional mechanics of gamification in service design to foster co-creation experiences. Value co-creation is included as a mediating variable in the relationship between the emotional mechanics of gamification and service design. A quantitative approach through structural equation modelling was applied. Simple random sampling and a self-administered questionnaire were used to gather data from 390 users of gamified sports applications. The study contributes to the literature on service design, gamification and value co-creation by proposing and validating a theoretical framework based on a mix of human-centred design and value-co-creation. It can also be applied as a practical tool in customer engagement.

Keywords: service design, value co-creation, user experience, emotional mechanics of gamification, service-dominant logic

1. Introduction

Service design has emerged as a discipline in recent decades. Once considered just another part of the new service development process, it is now viewed as one of the keys to this process (Yu & Sangiorgi, 2018). It has gone from being studied under a constructivist approach, as epitomised by the idea that the ultimate expression of design is form (Alexander, 1971), to a user-centred, multidisciplinary, co-creative approach (Costa *et al.,* 2018; Yu & Sangiorgi, 2018). Accordingly, there has been a push to incorporate user experience into the design process (Idougui *et al.,* 2012).

When organisations provide experience-centred services, users can build their own experiences through an interactive environment designed by service providers (Zomerdijk & Voss, 2010). This situation highlights the importance of incorporating value co-creation processes into experience design (Homburg *et al.,* 2017). It is thus possible to overcome the limitations of considering value as being embedded in the supply of services by instead using value-in-use as the starting premise (Vargo & Lusch, 2008), as under the service-dominant logic (S-D logic). To co-create value, understanding the user experience is essential (Wetter-Edman *et al.,* 2014), although understanding human experiences in value co-creation processes is acknowledged as being difficult (Trischler *et al.,* 2018).

To involve users and make interactions possible, internal support is needed to process data inputs and convert these inputs into actionable information (Grönroos, 2011). Gamification offers a tool to achieve this interaction. Gamification has aroused growing interest as an environment that is conducive to user involvement to enhance the user experience (Liu *et al.,* 2019; Hsu & Chen, 2018; Merhabi *et al.,* 2021). For users to experiment with a service, they need to use it for an extended period, with emotions leading to action (Bagozzi *et al.,* 1999). Gamification has been acknowledged in the

literature as a persuasive technological tool that encourages interactions between users and organisations thanks to the emotional context it creates (Yang *et al.,* 2017; Van Roy & Zaman, 2019). Shi *et al.* (2017) identified the emotional mechanics of gamification that elicit user emotions capable of driving them to interact.

S-D logic holds that firms do not provide value through their services but only a value proposition (Vargo & Lusch, 2004). Thus, user value unfolds through a co-creation process between service providers and users. Further, the actual value is determined solely by users' subjective experiences, which arise through the interaction with the provided service, generally referred to as value-in-use (Vargo & Lusch, 2008). Applying S-D logic in the context of gamified services, it is argued that the game elements embedded in gamified services offer a value proposition (Zomerdijk & Voss, 2010). The co-created value stems from user experiences as users interact with the gamified service (Vargo & Lusch, 2008). Importantly, this understanding integrates the provider and user perspectives, as input from both sides is required to allow for value co-creation.

Although S-D logic provides the basis for how value is co-created, its high-level perspective is difficult to operationalise (Wetter-Edman *et al.,* 2014). As a practice-based discipline, service design combines the premises of Vargo and Lush (2008) to form a co-creative, human-centred vision of S-D logic. However, this approach is still only partial (Maffei *et al.,* 2005) and could be combined with other approaches for the design of new services. Accordingly, firms offer potential value propositions (Grönroos, 2011) and have to seek new forms of encouraging sustained interaction with users through the evolution of their design process (Oliva & Kallenberg, 2003). The emotional mechanics of gamification can facilitate these interactions.

In this context, a recent literature review of empirical studies of gamification in service research suggests that gamification can be conceptualised in terms of value

creation (Ciuchita *et al.,* 2022). Although emotional mechanics of gamification and value co-creation through experiences **have been poorly studied** (García-Magro *et al.,* 2022). There is also a demand for studies that can provide an understanding of what mechanisms companies should implement to learn about value co-creation processes (Alves *et al.,* 2016). There is also a need for empirical studies to understand how to involve users in service design (Patrício *et al.,* 2018).

We adopt phenomenon-driven problematization, whereby underlying theoretical assumptions can be explained and analyzed alongside novel empirical material (Alvesson & Kärreman, 2007). Phenomenon-driven problematization helps us identify and scrutinize the limits of a particularly dominant theoretical metaphor in service design, which creatively leverages new empirical phenomena for theory building purposes. Through the reflexive and productive "interplay among theory, researcher subjectivity, and empirical material" new theoretical ideas may be developed, and old ones be challenged (Alvesson & Kärreman, 2007, p. 1266). So, phenomenon-driven problematization sensitises researchers to the importance of imagination and abduction to critically open up alternative ways of framing empirical material (Alvesson & Kärreman, 2007; Cornelissen, 2006; Weick, 1989).

Given this problematization in service design, the emotional mechanics of gamification and co-creation value processes offer interesting areas for advancing the research on service design as a form of operationalising S-D logic. Academic insight into the underlying mechanisms that explain how gamification engages consumers in a more casual setting still lags (Quian *et al.,* 2022). So, this paper explores the involvement of user experience in service design through value co-creation processes, where the emotional mechanics of gamification are used to create a conducive environment. The aim of this study is to analyse the impact of the emotional mechanics of gamification in

service design to foster co-creation experiences. Value co-creation is included as a mediating variable in the relationship between the emotional mechanics of gamification and service design.

The proposed theoretical model depicts the relationships between the focal variables (i.e. the emotional mechanics of gamification, the dimensions of value co-creation through user experience and service design). The hypothesised relationships are tested empirically. The analysis is based on a sample of user ratings of gamified sports applications. Sports apps provide an opportunity to study value co-creation processes and their implications in service design because they use a persuasive type of technology that engages users through attractive design elements (Zhou *et al.,* 2022).

The study thus responds to the call for holistic models from the value co-creation perspective to guide managers in service design and shed light on service design contributions through a customer and user-oriented perspective (Yu & Sangiorgi, 2018). A framework based on S-D logic for service design is proposed. This framework can also be applied as a practical tool in customer engagement, combining human-centred design, value-co-creation and user experience. This framework can contribute to the new service development process by connecting organisations' managerial practices to gamification and value co-creation. It can thus provide an understanding of the user experience to generate value propositions. User-centred approaches and tools such as gamification can help organisational staff build long-term capabilities to support users' value creation.

The article is structured as follows. Section 2 provides the background, and Section 3 presents the hypotheses and theoretical model. Section 4 describes the method and provides the results. Section 5 discusses the findings of the hypothesis testing. Finally, Section 6 presents the conclusions, limitations and suggestions for future research.

2. Background

The conceptual structure is based on the constructs of the emotional mechanics of gamification, value co-creation and service design in relation to S-D logic.

2.1 S-D logic as a theoretical foundation of service design and value co-creation

Service design has rapidly evolved to focus on ways to enhance the customer experience (Alkire *et al.,* 2020) where experiences are placed at the centre of the design process (Trischler *et al.,* 2018). Shostack (1984) was one of the first to argue that services can be designed intentionally and that they cannot be owned but only experienced. However, it was not until the 21st century that service design became a multidisciplinary, co-creative, user-centred approach (Yu & Sangiorgi, 2018; Prestes-Joly *et al.,* 2019), where the user experience is at the centre of all contributions to design (Meroni & Sangiorgi, 2011).

Service design can be addressed from a user-centred approach to offer design solutions through interaction design (Koivisto & Miettinen, 2009). It can also be addressed from a creative approach to develop new forms of value co-creation (Kimbell, 2011). And it can be addressed from a value co-creation approach to implement services (Patrício *et al.,* 2018; Wetter-Edman *et al.,* 2014). A common element across this variety of approaches is that user-centred design is a fundamental principle of service design.

Following Vink & Oerzen (2018, p. 472), most service design research has emphasised the benefits of this approach for co-creation. The argument is that it encourages a fit between services and their users, builds on a mutual understanding between stakeholders and supports the development of new services (Yu & Sangiorgi, 2018).

Traditionally, an experience was seen as something designed and orchestrated by service providers for users (Haeckel *et al.,* 2003; Trischler & Westman, 2022). Under the S-D logic approach, experience is determined by users as a result of their participation in value co-creation activities (Becker & Jaakkola, 2020). Hence, providers do not design experiences per se but instead design value propositions aimed at helping users create value and consequently the experiences they desire (Teixeira *et al.,* 2012). As highlighted by Trischler & Westman (2022), a key influence in this evolution is the 10th fundamental premise of S-D logic. According to this premise, value cannot be predefined by the service provider. Instead, it is the beneficiary actor who experientially determines value (Vargo & Lusch 2008).

Service design follows S-D logic. It must be "largely focused on operant resources with which the firm is constantly striving to make better value propositions than its competitors" (Vargo & Lusch, 2004, p. 5). Under this paradigm, all social and economic actors are resource integrators (Vargo & Lusch, 2008). Service providers can only make value propositions that customers convert into value through use (Lusch & Vargo, 2006). Consumers shift from being passive users to active co-creators of value (Vargo & Lusch, 2008), and "value is always uniquely and phenomenologically determined by the beneficiary" (Vargo & Lusch, 2016, p. 6). This view highlights the experiential nature of co-creation (Aitken & Paton, 2016). According to Brodie *et al.* (2019), the evolution of S-D logic towards this co-creation approach is rooted in the change of view expressed by Prahalad and Ramaswamy (2004a) towards an interest in exploring the co-creation of customer experiences.

Accordingly, S-D logic provides the foundations for service design (Costa *et al.,* 2018). The holistic approach of S-D logic offers the main theoretical lens to conceptualise value co-creation from the user experience and thus explain customer value creation in

service experience. Under this conceptualisation and drawing on the reasoning of Wetter-Edman *et al.* (2014) for service design, several steps can be identified. (1) Users, or communities of users, are an operant resource during the service design process because they activate their resources such as knowledge, skills and motivation to participate in the creation of value. (2) Designers act as the facilitators of value co-creation by combining the organisation's resources with those of users. (3) Designers create technology-based value propositions focused on the user experience.

Following on from these ideas, more recent studies have highlighted the importance of understanding how the integration of digital technology into a firm's value proposition can change the nature of co-creation with users. S-D logic redefines production and consumption models, where customers and service providers collaborate on a single platform and co-create value for all parties involved (Ling *et al.,* 2021). This scenario paves the way for entirely new platforms, applications, subscription models and user–business relationships, encouraging the rapid evolution of service design towards ways to improve the user experience (Calabretta & Kleinsmann, 2017; Alkire *et al.,* 2020).

The growing use of digital interfaces for services and the transition of the technology industry towards services and service platforms is increasingly leading designers to address service design from a user experience approach (Roto *et al.,* 2021). Many researchers argue that user experience is the result of interaction with the service interface. This argument implies that service design should be focused on understanding users to help co-create value through a user-experience-centred service interface that is useful, usable and emotional (Lee *et al.,* 2018).

2.2 S-D logic as a theoretical foundation of the emotional mechanics of gamification and value co-creation

The gamification literature is vast. Gamification uses the features of games to engage users and channel their behaviour towards a desired outcome.

In business, gamification has been recognised as an effective tool to promote stakeholder engagement (Leclercq *et al.,* 2018), to engage users and solve problems (Zichermann & Cunningham, 2011) and to incentivise value co-creation through customer participation in service design (Huotari & Hamari, 2017). The new generation of customers is used to gamified experiences. Therefore, many industries have sought to develop methods and tools to produce, apply and use gamification techniques that enhance customer engagement with their goods and services (Liu *et al.,* 2020).

As reported by Leclercq *et al.,* (2018) there are two major perspectives in gamification: that of the designer and that of the user. From the designer perspective, Deterting *et al.* (2011, p. 10) define gamification as "the introduction of game mechanics and elements to design non-game contexts" to influence user behaviour (Werbach & Hunter, 2012). From the user perspective, Huotari & Hamari (2017, p. 25) define gamification as "a process of enhancing a service with affordances for gameful experience to support customers' overall value creation". This conceptualisation is rooted in S-D logic, suggesting that users are value co-creators and that the company can provide opportunities for them to experiment with the gamified system (Hsu & Chen, 2018). User experience and value co-creation are therefore crucial in gamification (Leclercq *et al.,* 2018; Merhabi *et al.,* 2021; Patricio *et al.,* 2020). They provide the basis for the link between gamification and service design research.

Although gamification is not restricted to technology use, organisations today leverage network effects to develop digital platforms whose user interface includes gamification elements with which users can experiment. The elements that make up the user interface can encourage user engagement with the service and can get them involved

with design elements (Zhou *et al.,* 2022). From this perspective, gamification can also be defined as "incorporating game elements into a non-gaming software application to increase user experience and engagement" (Domínguez *et al.,* 2013, p. 381).

Gamification can support value co-creation processes thanks to the network of relationships and interrelationships facilitated by gamified systems. They also support value co-creation in other ways. For instance, they facilitate an engaged and collaborative environment provide rules and processes to involve teams and create high-quality solutions in an open, creative environment, help coordinate knowledge between different actors and the co-creation organisation and influence the user experience by stimulating the emotional component of the game mechanics of gamified platforms (Merhabi *et al.,* 2021). Additionally, the value co-creation process requires user engagement, and the influence of emotional states is crucial to ensure co-creative success (Wu & Gao, 2019).

From a psychological perspective, self-determination theory is often used in the gamification literature to explain why gamification is effective at attracting users (Tobon *et al.,* 2020). According to self-determination theory (Ryan & Deci, 2000), people have three basic psychological needs: competence, autonomy and relatedness. When these needs are met, people gain a sense of satisfaction and well-being. The theory of intrinsic and extrinsic motivation (Ryan & Deci, 2000) and flow theory (Csikszentmihalyi, 1990) have also been widely used. These theories are concerned with human motivation and the impulse to meet innate psychological needs.

Building on these foundations, new methodological approaches that invoke the role of emotions to understand gamification have emerged. For example, Robson *et al.,* (2015) proposed the MDE (mechanics, dynamics and emotions) model as a framework to show how the mechanics, dynamics and emotions of gamification can be used to create gamified experiences. Later, Mullins & Sabherwal (2020) extended the theoretical MDE

model, explicitly depicting emotions as a key factor in human behaviour. They thus provided a cognitive and emotional perspective of gamification that explains how game mechanics can interact with emotion and cognition to produce desired outcomes.

Shi *et al.,* (2017) proposed the emotional mechanics of gamification as a framework to speed up the transformation of advanced services. This framework is built on a combination of extrinsic elements (utilitarian), intrinsic elements (hedonic) and social elements (relations) that elicit emotional responses in users that lead them to a desired outcome. Gamification strengthens extrinsic incentives, which should promote positive behaviour and encourage users to continue to participate in the game (Werbach & Hunter, 2012). Intrinsic benefits include increased levels of power, responsibility and leadership (Conaway & Garay, 2014). Regarding social elements, gamification technology provides instant connections to social networks where participants can gain a sense of recognition from other users and achieve a feeling of collaboration and belonging to a group (Conaway & Garay, 2014; García-Magro & Soriano-Pinar, 2020).

S-D logic offers an ideal theoretical framework to show that gamification places the user experience at the centre of the service offering (Wolf *et al.,* 2020). In the context of gamified services, user value is reflected in game experiences (Huotari & Hamari, 2017). Under S-D logic, gamification through a technology platform and user interfaces configured with game elements provide the value proposition for users to experience and co-create value. In short, the users are the value creators. The company simply provides opportunities, through the user interface, for users to experiment with the gamified system (Hsu & Chen, 2018).

Following Landers *et al.,* (2018), the four types of constructs studied within gamification science are game elements (predictors), targeted organizational outcomes (criteria), intermediary individual changes (mediators), and personal and situational

contexts (moderators). In this sense, game elements could improve emotional mechanics, which in turn improves co-creation value and service design (criteria). Different causal pathways may be moderated by other variables. Further, each of these relationships may be moderated such that the context in which gamification takes place, both in terms of the people experiencing it and the broader situation, may affect the direction and/or strength of the relationships between game elements, state changes, and target outcomes.

3 Theoretical model and hypotheses

The previous section provides the theoretical framework for the present study. This section presents the hypotheses. These hypotheses are based on the relationship between the emotional mechanics of gamification, value co-creation and service design. In this research, emotional mechanics act as predictors in the context of gamification science. They are established as an antecedent of co-creation value and service design (criteria) and are introduced as a process intervention, provoking psychological and behavioral changes within an individual. ~~As Hamari & Koivisto (2014) established, psychological mediators are causally related to behavioral mediators, and behavioral mediators lead to changes in larger-scale valued criteria~~.

As explained in the previous section, the S-D logic framework is suitable for application in gamified contexts (Wolf *et al.,* 2020) because services in the form of gamified systems represent the value proposition of service providers to users, and co-created value is derived from user experiences when interacting with the service (Vargo & Lusch, 2008. Today, gamified services focus on the user experience by using game elements (Huotari & Hamari, 2017; Wolf *et al.,* 2020) with suitable characteristics for use as a value co-creation tool. Nike offers an excellent example of a gamified platform oriented at value co-creation (Ramaswamy, 2008; García-Magro *et al.,* 2022).

Gamification has been cited in the literature as a motivational tool that drives emotions (Mullins & Sabherwal, 2020) and encourages interactions between users and organisations (Yang *et al.,* 2017). The integration of game elements such as rewards, challenges and social networks elicits specific emotions in users that promote outcomes from the gamified experience (Mullins & Sabherwal, 2020). This is known as the emotional mechanics of gamification (Shi *et al.,* 2017).

The term "emotional mechanics of gamification" does not refer to the emotions of users but rather to the mechanics that lead them to continue using the service and direct their behaviour towards the desired goal. Emotional psychology explains that emotions have implications for action and goal achievement. It is argued that these emotions do not emerge on their own but are instead shaped by the interaction of the implemented mechanics and dynamics (Bagozzi *et al.,* 1999). It is therefore assumed that the emotions aroused in users through these mechanics drive ongoing experiences and that, when this situation occurs, users are more likely to engage in co-creative processes.

However, much of the gamification literature has focused on user emotions as antecedents to other outcomes (Ciuchita *et al.,* 2022). One example is the attempt to understand the impact of user emotions on the intention to use (Hassan *et al.,* 2019), involvement (Mulcahy *et al.,* 2020), customer commitment, willingness to pay, and customer referrals (Wolf *et al.,* 2020), and the satisfaction of needs (Bitrián *et al.,* 2021). Through these studies, it has been shown that when users interact with game elements, they stimulate their emotions, which leads them to a desired outcome.

Following Sardi *et al.,* (2017), rewards, challenges and social networks are pillars of gamification. Rewards are perceived as a core gamification strategy for users who accomplish the requested tasks. Some of the means used to promote competition are setting challenges and making the tasks visible to other users (Park & Bae, 2014) and

social networks to increase engagement and interaction among the users (Palmer *et al.,* 2014). Gamification thus promises a dual improvement consisting of making the activities more pleasant while ensuring people's long-term engagement with tasks perceived to be demotivating. Basically, a range of emotional, cognitive and social benefits are ascribed to gamification (Turan *et al.,* 2016).

Thus, considering that the co-creative and service design processes require user commitment, game elements such as rewards, challenges and social network are the "predictors" that are integrated to shape the emotional mechanics of gamification (García-Magro *et al.,* 2022).

Moreover, the value co-creation literature provides arguments that incentives in the form of extrinsic rewards, such as fun, curiosity, learning/skill development and shared information, are important in co-creation projects (Yim *et al.,* 2012). Therefore, the idea is for gamification to use mechanics that stimulate the emotions of users and create a collaborative environment conducive to the development of value co-creation through experiences. Examining the link between gamification and co-creation offers a better understanding of how co-creation practices can be enhanced (Patrício *et al.,* 2018, p. 146).

The present study extends the arguments of Patrício *et al.,* (2020) on the benefits of linking gamification and value co-creation and takes as a reference the work developed by García-Magro *et al.,* (2022) with the idea that the emotional mechanics of gamification favour the value co-creation process. The following hypothesis is proposed:

H1: The emotional mechanics of gamification positively influence value co-creation through user experience.

The service design literature and the value co-creation literature are related (Costa *et al.,* 2018; Yu & Sangiorgi, 2018). Wetter-Edman *et al.,* (2014) have written extensively

on the relationship between value co-creation and service design through S-D logic. They argue that participation in design is a source of value co-creation because value co-creation happens not only during use as a result of service interactions but also during design. According to Wetter-Edman *et al.,* (2014, p. 9): "Value co-creation is described as part of the design activities, when actors participate and integrate their resources in designing for service, and as part of the use activities, when actors access and operate on resources to achieve their goals".

There has been a growing movement in service design to appreciate users as partners in the design process and, consequently, for value co-creation (Vink & Oerzen, 2018). The literature defends that the consideration of co-creative processes in service design fosters the fit between services and users, supports the development of new and existing service (Hollyday *et al.,* 2014) and leverages a mutual understanding between involved actors (Fjuk *et al.,* 2016). Dixon *et al.,* (2014) highlighted the importance of customer value co-creation applied to the design of services and experiences in which customers participate. They highlighted the relationship between these two ideas and the value of studying the links between them. They endorsed the consumer behaviour focus and the need for involvement, engagement and interrelationships. Definitely, most research in service design has accentuated the beneficial nature of co-creation (Vink & Oerzen, 2018), however, more empirical studies are needed to validate these arguments and help understand whether the co-creation experience is key to service design.

This approach leads to the assertion that placing users in a value co-creation environment is expected to have a positive impact on service design. This idea leads to the second hypothesis:

H2: Value co-creation through user experience positively influences service design.

Service providers must engage consumers using tools for interaction and collaboration to improve the service in order to develop an effective service design. In this context, there is an increasing interest in the methods and tools that are needed to understand users and in how to transfer that understanding into successful service propositions and profit (Grenha-Teixeira *et al.,* 2017; Trischler & Scott, 2016).

Tools have been used to try to capture the user experience. Examples include co-design workshops, focus groups, in-depth interviews, storyboarding, customer journeys, user testing and trials (Yu & Sangiorgi, 2014). To ensure that consumers are engaged in service design, organisations must focus on creating experiential environments that stimulate consumption emotions because the emotions of customers play a key role in service encounters.

Technology has played an increasingly prominent role in service design to ensure memorable service experiences (Zehrer, 2009). To take full advantage of these capabilities, technology must be fully integrated into service design and management with a general customer orientation (Zeher, 2009). According to Zhou *et al.,* (2022), when users can modify the functions, user interface and physical appearance of an application to suit their preferences, it can lead to prolonged use, which entails engagement with the elements of service design.

So, consumers are attracted to emotional and sensory elements that allow them to create relationships. Therefore, they seek to buy emotional experiences instead of goods or services. The literature shows the importance of the role of emotions in service encounters (Cook *et al.,* 2002). These emotions should be viewed as a central component in understanding the consumer experience (Menon & Dubé, 2000) and hence a key element in the service design phase to engage users.

In this sense, gamification has been cited in the literature as a motivational tool that drives emotions (Mullins & Sabhrewal, 2020) and encourages interactions between users and organisations (Yang *et al.,* 2017) making way for emotional mechanics. Following Shi *et al.,* (2017, p. 83): "it is apparent that emotional mechanics of gamification can aid efficiency and the exploration of novel aspects of innovative activities".

Although there are works concerned with studying the relationship between gamification and service design (García-Magro & Soriano, 2020; Patrício & Morozumi, 2018), the literature lacks empirical evidence of the influences that gamification has on service design from a user experience perspective. Emotional mechanics of gamification can be considered as an antecedent of service design. The following hypothesis is therefore proposed:

H3: The emotional mechanics of gamification have a positive influence on service design.

Under the S-D logic perspective, customers cease to be mere users and instead adopt the function of value co-creators with an active and interactive role (Grönroos & Voima, 2013). A context of experiences and co-creation thus emerges as the result of multiple interactions that are heavily influenced by the emotional stimuli that are created (Berry *et al.,* 2002). Furthermore, because the value of gamified services is reflected in user experiences during use and interaction with game elements, S-D logic combines the design and user experience perspective (Hammedi *et al.,* 2017).

Co-creation entails allowing users to co-create their own experience as well as welcoming their input in the design of solutions (Prahalad & Ramaswamy, 2004b; Patricio *et al.,* 2020). Designers have moved away from creating a functional service that engages users towards creating platforms that users can modify as they desire. This

approach can only work if it provides enough freedom for users to create value in use (Calabretta & Kleinsmann, 2017).

As discussed earlier, the literature acknowledges the ability of gamification to engage participants and directly influence their emotional state (Petridis *et al.,* 2014; Shi *et al.,* 2017). Gamification uses various elements of games, including rewards, points, and feedback, which help develop emotions (Van Roy & Zaman, 2019; Xi & Hamari, 2019; Bitrián *et al.,* 2020; Feng *et al.,* 2020). These emotions are, in turn, expected to influence service design positively. Sangiorgi (2012) proposed that service design can be developed on two parallel levels. One level consists of service design methods with a focus on improving service experiences and offerings designed around customer needs. On another level is the consideration of value co-creation that can transform the way organisations perceive their role, offerings and innovation processes. In this context, co-creation may mediate the relationship between the emotional mechanics of gamification and service design, leading to the following hypothesis:

H4. Value co-creation through user experience mediates the relationship between the emotional mechanics of gamification and service design.

Figure 1 depicts the theoretical model that captures these hypotheses.

[Insert Fig. 1. Theoretical model]

4 Method

4.1 Sample

The empirical study to test the hypotheses was based on a sample of user ratings of gamified sports apps. In the context of gamification, sports apps have received considerable attention (e.g. Bitrián *et al.,* 2020). The content and functions contained in a sports app from the perspective of users and the company are ideal for analysis related

to gamification (reward system), value co-creation (through user engagement) and service design (through the information provided). Garmin and Nike are very good examples of companies that have introduced sports apps whose user interface includes gamification-specific design elements such as daily physical activities, challenges and leaderboards (Zhou *et al.,* 2022). These elements engage users in service design in a convenient and accessible way (Feng *et al.,* 2020). These companies thus turn their marketing approach into a service offering. Gamified platforms facilitate participation in co-creation processes through the user experience. The data gathered by the company provide it with knowledge that it can use in the design of new services.

The fieldwork was performed by a market research company. The sample was drawn from a consumer panel. A general consumer panel, also known as a generic panel, was used for this study. In such panels, the market research company chooses participants randomly in accordance with the research objectives. In this case, participants were chosen based on the usage of the gamified sports apps of Nike+, Garmin and MiFit. Panel members were chosen to be representative of the target group. The study used data from self-reported measures from an ad hoc survey. An online questionnaire was sent to potential participants. Ethical issues were considered (Petousi and Sifali, 2020). Data were collected in September and October 2020. The final sample consisted of 390 valid questionnaires. The fieldwork company recorded a response rate of 68%. Questionnaires or reminders were sent up to three times. The structure of known variables for the population was also replicated in the sample. Therefore, non-response bias was not a concern in this study. Table 1 provides details of the final sample.

[Insert Table 1. Sample profile.]

4.2 Measurement instrument: questionnaire

Scales for the study constructs were adapted or constructed if previously validated scales were not available (Zhou *et al.,* 2022). For the emotional mechanics of gamification construct, items from scales validated in the literature on hedonic aspects were used (Conaway & Garay, 2014). Other items were adapted based on the theoretical foundations in the literature (Liu *et al.,* 2019).

In relation to value co-creation through experience, the questionnaire used the scale validated by Albinson *et al.* (2016) from the DART (dialogue, access, risk and transparency) model proposed by Prahalad & Ramaswamy (2004a). This scale was used to measure the ability to engage users and trigger the necessary interactions for value co-creation. The literature tends to focus on the DART model as an effective model to help organisations implement experience-based value co-creation processes (Mazur & Zaborek, 2015).

The measurement of service design represented a challenge. As noted by Foglieni *et al.* (2018), it is an evolving field where it is still difficult to determine how existing measures can be applied. In the absence of validated scales, the theoretical foundations were used to produce items directly related to service design practice (Balaguer *et al.,* 2008; Sierra *et al.,* 2009; Hariyanto *et al.,* 2020; Xi & Hamari, 2019). Because this study contextualises service design in a digital environment from a user experience perspective, navigability and interconnectivity are considered indispensable in design practice (Zhou *et al.,* 2022; Zhang *et al.,* 2017). They were included to measure this construct.

A pre-questionnaire was evaluated by five academic experts in marketing, service management and statistics, who were consulted regarding the suitability of the items. A pilot test was conducted with 15 users of sports applications to ensure that all questions were well understood and could be refined if necessary. The final questionnaire contained the items in Table 2. A five-point Likert scale ranging from 1 (*not at all important*) to 5

(*very important*) was used to score the items. IBM SPSS Statistics and the open software JASP were used for all statistical analyses.

[Insert Table 2. Constructs, items and theoretical sources.]

First, common method bias was analysed (Podsakoff *et al.,* 2003) ex ante and ex post following the data collection and analysis procedures. Ex ante, participation in the study was voluntary and the subjects were guaranteed anonymity and data confidentiality. The dependent and independent variables were placed on different pages of the electronic survey. This layout prevented respondents from inferring cause–effect relationships between the constructs. According to Podsakoff *et al.* (2003), this approach reduces the likelihood that participants respond dishonestly or artificially. The ex post statistical analysis of common method variance was investigated in two ways. First, the Mann-Whitney U test was performed for early and late participants for the means of all variables. The Mann-Whitney U Test evaluates whether two samples are likely to originate from the same underlying population. The first 50 observations were used as early participants, and the last 50 observations were used as late participants. The results show that the significance value for the variable was not less than 0.5, so it was non-significant. Hence, there was no statistically significant difference between early and late participants. Second, Harman's single factor test was conducted. The single factor explained only 27.31% of variance. These tests show that common method bias was not an issue for the data used in this study. Thus, it was safe to proceed with the analysis.

Questionnaire validation aims to provide interpretations about the meaning of what is being measured and the usefulness of the measurement instrument. This validation was performed using analysis of the psychometric properties of the measurement scales, namely validity, reliability and dimensionality (Churchill, 1979; Anderson & Gerbing, 1988). Content validity was supported by the review of the literature on the emotional

mechanics of gamification, the components of value co-creation and service design (Table 2).

Exploratory factor analysis (EFA) was used to check construct validity analytically. Principal component analysis (PCA) was used to extract the factors (using the Kaiser and Varimax rule). The Kaiser-Meyer-Olkin index (KMO) took the value 0.951, indicating excellent sample adequacy for the EFA (> 0.6). Bartlett's test of sphericity was significant. This result suggests suitability for exploratory factor analysis. Moreover, the relationships between the items were statistically significant and provided a parsimonious set of factors. Therefore, the variables had an adequate fit to the estimated factor structure (Hair *et al.,* 2006). The EFA revealed three factors with an explained variance of 59%. The three factors corresponded to three blocks: Factor 1 gamification (GA), Factor 2 service design (DS) and Factor 3 co-creation (CO).

Questionnaire reliability refers to the consistency of responses. Internal consistency was analysed using Cronbach's alpha coefficient. The value of Cronbach's alpha (α = 0.958) indicates good reliability. This value did not improve after eliminating any of the items. Considering the constructs, all a priori scales presented satisfactory reliability in terms of Cronbach's alpha (> 0.883). All items loaded strongly on the constructs, with composite reliabilities that were greater than the recommended value of 0.7, suggesting a satisfactory level of reliability (Hair *et al.,* 2006). Table 3 presents the results.

[Insert Table 3. Analysis of measurement instruments.]

Discriminant validity was examined by the average variance extracted (AVE) scores for each research construct and compared with the square correlations among the constructs (Fornell and Larcker,1981). The square correlations among the constructs were 0.388 (GA-CO), 0.196 (GA-DS) and 0.274 (CO-DS). The average variance extracted

(AVE) for each construct ranged from 0.517 to 0.580. The items signify a distinctive underlying concept. An average variance extracted of 0.5 or higher shows adequate convergent validity.

The multicollinearity of the model was also studied. Severe multicollinearity can increase the variance of the coefficient estimates and make the estimates highly sensitive to minor changes in the model. In such cases, the coefficient estimates become unstable and difficult to interpret. To address multicollinearity, the established procedures were followed to mean-centre the related variables prior to generating proposed interaction terms to assess the hypotheses. The correlations between items were also analysed. There was no evidence to suggest the presence of common method bias in this study.

The Kolmogorov-Smirnov test showed that the data did not satisfy the normality hypothesis. The independence of the residuals of the model was tested using the Durbin-Watson test. The value was very close to 2, suggesting independence of the residuals of the model. The homoscedasticity hypothesis was confirmed with Levene's test, with a *p* value of 0.382.

4.3 Analysis techniques

Due to the characteristics of the data and the type of model, structural equation modelling (SEM) was used for the hypothesis testing (Hair *et al.,* 2011). To test simple mediation models, several authors (Cheung & Lau, 2008; Iacobucci *et al.,* 2007; James & Brett, 1984) have recommended the use of structural equation models. The main reasons for this recommendation include the ability to control for measurement error, the ease of using multiple indicators of constructs and the variety of model fit measures available.

Following Dash & Paul (2021), the process of SEM involves various steps: (1) *individual constructs* -these must be adequately defined, all latent variables must be shown in a hypothesized model; (2) *preparing for CFA* - once the constructs are defined, the measurement model must be specified. (3) *running CFA* - the specified measurement model must be assessed for reliability as well as validity and both convergent and discriminant validity are evaluated to ascertain the measurement models' nature. Once reliability and validity are assessed, the model is evaluated for model fit. It includes all three categories of model fit indices: absolute, incremental, and parsimonious (4) *structural modeling* - the focus moves to the relationship among constructs. All the structural relationships are tested (hypothesis testing) with the help of relevant statistical tools, especially regression/ path coefficients.

Steps (1), (2) and partially (3) have been done in section 4.2. Partially step (3) and step (4) are presented below.

We use CB-SEM as our model is a factor-based model. The measurement and structural models were tested. The measurement model was tested to identify the causal relationships between variables (observed items) and latent constructs (unobserved). The structural model was tested using regression paths, which explain the causal associations between the constructs (Anderson & Gerbing, 1988).

The programme used for this analysis was JASP. The SEM module in JASP is based on Yves Rosseel's "lavaan" package for R (Rosseel, 2012). The hypothesis testing was performed using standardised paths, which were estimated using a bootstrapping procedure (Chin, 1998). Specifically, when ordinal data that do not follow the normal distribution are used, the practical application of this method requires the transformation of the data. Bootstrapping methods were used with 1,000 samples for resampling and corrected 90% confidence intervals.

4.4 Analysis of the measurement and structural models

The relationships associated with the measurement model are causal relationships between variables (observed items) and latent constructs (unobserved). These relationships are described. Table 4 shows the estimates accompanied by the *p* value, the assigned interval and their standardised values.

[Insert Table 4. Measurement model parameters.]

All items are necessary and significant to define the latent variables. The standardised estimate for the whole model indicates that no ratio stands out as being most important in the model. The standardised values range from 0.618 in DI_3 to 0.762 in CO_4.

Analysis was performed to determine whether the discrepancy between the reproduced matrix and the original data was significant. That is, the analysis examined whether the model offered a good fit to the observed data. The chi-squared statistic for goodness of fit was used. A *p* value of 0.059 was observed. The value of *p* was greater than 0.05 for the model, so the null hypothesis of adequate fit between the data and the model was not rejected.

To evaluate the model's fit to a baseline model, absolute and incremental measures of fit were used. The root mean squared approximation of error (RMSEA), non-normalised fit index (NNFI), comparative fit index (CFI) and incremental fit index (IFI) were used (Byrne, 2006; Hair *et al.,* 2006). Table 5 shows the values.

[Insert Table 5. Unconstrained model goodness-of-fit measures.]

The value for the root mean squared approximation of error (RMSEA) absolute fit index was 0.039 (< 0.05), which indicates an acceptable overall fit. That is, the model is

capable of predicting the matrix of initial data. The incremental fit indices compare the estimated model with a model in which the variables are unrelated. The NNFI, or Tucker Lewis index, overcomes the limitations of the NFI by considering the degrees of freedom of the proposed model, provided its relationship with sample size is weak. This index ranges from 0 to 1, with a recommended value greater than or equal to 0.9 (here 0.881, which is similar to 0.90). The value for the CFI (0.906 > 0.90) indicates a good fit. This incremental fit index estimates the fit of the model with the null baseline model. Finally, the IFI took a value of 0.906, which is greater than the recommended threshold of 0.90, thereby illustrating the adequate fit of the measurement model. The findings for the confirmatory factor analysis reveal adequate fit.

Table 6 presents the relationships associated with the structural model. Specifically, it shows the regression paths that explain the causal associations between the constructs (unobserved).

[Insert Table 6. Parameters and effects associated with the structural model without restrictions.]

H1 proposes that the emotional mechanics of gamification positively influence the components of value co-creation through user experience on the gamified sports application (alpha = 0.971, $p < .001$). Hypothesis H1 is supported by the data. H2 proposes that the components of value co-creation through the user experience positively influence service design (beta = 0.671, $p < .001$). Hypothesis H2 is supported by the data.

Notably, for H3, the direct relationship between GA and SD is not significant (p value = 0.476) in this unconstrained model. The explanation is that the direct relationship disappears when the effect of the mediating variable CO appears. In other words, the direct relationship between GA and SD decreases or disappears because the components

of value co-creation through user experience mediate the relationship between the emotional mechanics of gamification and service design (H4). To test this hypothesis, two alternative structural models were used.

First, an alternative simple direct model that only considers the relationship of GA with DS was considered. Second, an alternative simple indirect model that only considers the relationships between GA and CO and between CO and DS was considered. These models are shown in Table 7.

[Insert Table 7. Parameters and effects associated with the direct and indirect simple structural models.]

Analysis and comparison of the results of the unconstrained structural model and the simple direct and indirect models provide interesting conclusions. For the *direct simple effects model,* Table 7 shows that the independent variable (GA) is significantly and positively related to the dependent variable (DS). This result is validated by the *p* value (< 0.001) and the confidence interval for the parameter (0.602, 0.904), which does not contain the value 0. The direct relationship (H3) is supported. For the *indirect simple model*, Table 7 shows that the independent variable (GA) is significantly and positively related to the mediating variable (CO) and that the mediating variable (CO) is significantly and positively related to the dependent variable (DS). Because the model is constrained, the indirect effect and the total effect are the same. The indirect relationship (H1 and H2) is supported. The numerical values indicate a particularly strong relationship between CO and DS. For the unconstrained model, direct and indirect relationships are allowed simultaneously (Table 6). The direct relationship is absorbed by the indirect relationship. The *p* value (0.476) and confidence interval (-0.257, 0.382) indicate a direct relationship that is not distinct from zero. The ratio or proportion between the indirect and

the total effect (0.854) confirms the predominance of the indirect effect. Thus, there is mediation.

To check formally whether the constrained model (*indirect simple model*) provides an improvement in fit with respect to the unconstrained model, the two models were compared using the difference in the χ^2 statistics.

Constrained model (the GA–DS is not allowed): χ^2_{322} = 362.747 with $p < 0.058$

Unconstrained model (the GA-DS relationship is allowed): χ^2_{321} = 361.644 with $p < 0.059$

$\chi^2_{322} - \chi^2_{321} = \chi^2_1 = 1.103$ with $p = 0.294$

The null hypothesis is accepted because the experimental p value is large and the test is non-significant. Thus, this difference is non-significant, and there are no differences between the two models. The existence of mediating effects is confirmed, so H4 is supported. Figure 2 graphically shows the unconstrained model with the standardised estimates.

[Insert Figure 2]

5 Results and discussion

S-D logic provides the theoretical underpinnings of how value is co-created. However, such an approach is difficult to operationalise on a practical level (Wetter-Edman *et al.,* 2014). As a practice-based discipline, service design builds on the premises of S-D logic to form a co-creative, human-centred vision for designing new services. Companies provide potential value propositions (Grönroos, 2011) and must look for ways to encourage more enduring interaction with their users (Oliva & Kallenberg, 2003). The emotional mechanics of gamification can facilitate such interactions and can shed light

on the mechanisms that companies can implement to learn about consumers' value co-creation processes.

This paper explores the influence of the emotional mechanics of gamification on value co-creation and service design. If a tool can arouse positive emotions in users, then the company using this tool can achieve an environment conducive to interrelations, which are essential in the processes of value co-creation and service design. Service design, value co-creation and gamification have extensive theoretical foundations in the literature but little empirical support.

The empirical results based on data from users of gamified sports applications show that the emotional mechanics of gamification positively influence the components of value co-creation (H1 is contrasted). Previous studies analyze the relationship between gamification and the co-creation of value (García-Magro *et al.,* 2022; Lopes *et al.,* 2022; Rodrigues *et al.,* 2021; Nobre & Ferreira 2017), however, there are few that empirically validate this relationship. As an exception, García-Magro *et al.,* (2022) measure the impact of each one of the emotional mechanics of gamification in each one of the components of the co-creation of value. Their results show that all the emotional mechanics of gamification positively influence at least one component of co-creation, highlighting social mechanics as the most influential dimension to participate in co-creative processes. The present study advances in this line when considering the impact on the co-creation of value considering the emotional mechanics construct.

As Palma *et al.* (2019) explain, the motivating customers to participate in the co-creation process remains a challenge for companies. They should focus on finding the motivators that encourage customers to participate in value co-creation. In this sense, the literature argues that game elements can provoke specific emotions and cognitions in the user that promote the desired results of the gamified experience (Mullins & Sabhrewal,

2020; de Jong *et al.,* 2021). The challenge is to find which game elements have the capacity to drive users towards value co-creation and service design, and therefore, can be incorporated into the so-called "emotional mechanics of gamification". This study validates the rewards, challenge and social network as emotional mechanics that jointly promote participation and the continued use of a gamified system and favor the co-creation of value and the service design. These results are consistent with those obtained by Nobre & Ferreira (2017). These authors explore the motivations that lead to the implementation of gamified systems with a clear impact on value co-creation and brand value and conclude that challenges are among the main reasons why users get involved in a gamified system, contact and competition with known people and continuous rewards. According Schiavone *et al.,* (2020), one of the latest research streams explored in the field of services is the use of digital technologies as facilitators of value co-creation. It is argued that organizations increasingly rely on developing digitization capabilities to find new forms of experience and co-create value with their customers (Lenka *et al.,* 2017). This research sheds light on this goal and confirms that the emotional mechanics of gamification (in a digital environment such as sports applications) provides an explicit way to achieve it. In addition, gamification makes it easier to influence the long-term emotional states of users, creating a genuine value co-creation environment.

There is positive evidence that value co-creation influences service design (Costa *et al.,* 2018; Wetter-Edman *et al.,* 2014; Yu & Sangiorgi, 2018). The empirical analysis reveals that this relationship is very strong, contrasting H2. Thus, if users are involved in a context of value co-creation, this involvement positively affects the design of services through the user experience. This finding is particularly relevant and leads to the reflection that generating a context of co-creation is difficult but that its positive impact on service design should be considered an important antecedent. Freire & Sangiorgi

(2010, p.48) in the field of service design establish that: "the implementation of the co-creation model asks designers to develop news skills, sensitivity and attitudes. Generating lasting and transformative projects require participatory design and it is necessary co-create flexible platforms or 'infrastructures' that people can own, inhabit and transform".

In this co-creation context, the emotional mechanics of gamification positively directly and indirectly influence service design (H3 and H4 are contrasted). Regarding the direct effect, previous studies have linked gamification with the service design. Patrício & Morozumi (2018) analyze the deployment of ideaChef® gamified method and tool from the perspective of service design experts or García-Magro & Soriano-Pinar (2020) propose a model of analysis that justifies gamification as an adequate tool to improve the design of services through the Human Centered Design methodology. Both argue that gamification can support service design, enhancing user engagement and co-creating new services with a diverse group of stakeholders. Providing empirical evidence, our results allow us to affirm that gamified platforms represents an opportunity to observe users' behaviour in its most natural state while they play the role of co-creators of value thanks to the emotional mechanics of gamification. Experience is the main goal of the design process (Kaasinen *et al.,* 2015). Users are engaged with the platform and share and provide feedback that can be used for service design (Zamenopoulos & Alexiou, 2018). All in all, the effectiveness of gamification as a tool to contribute to service design is highlighted.

The indirect relationship is introduced with mediation, specifically, value co-creation through user experience mediate the relationship between the emotional mechanics of gamification and service design, being contrasted H4. Thus, the direct effect of emotional mechanics on service design is displaced by the value co-creation.

This result is interesting in that the mediation relationship creates opportunities for research on service design, where customer engagement promotes not only customer value co-creation behaviours (Zhang *et al.,* 2017) but also service design. As noted by Zhang *et al.* (2018), when customers co-create value with the firm, they acquire a higher level of engagement, and this engagement is fundamental to the practice of service design. Thus, if users operate in a value co-creation environment characterised by interrelationships and information flow between different peers and between peers and service providers, the emotional states of users in gamified systems will push them towards engagement in service design. Getting consumers to experience positive emotions over a long period also requires constant involvement from the members of the organisation. Hence, to keep users engaged in the long term, service providers must first make their engagement with users last over the long run. Gamification can make it easier to maintain this long-term engagement, thus making it an antecedent of the service design process.

The finding validates the theoretical underpinnings of S-D logic in that designers focus on operational resources to realise better value propositions. This idea is related to the assertions of Kaasinen *et al.,* (2015) that designers can only facilitate, not guarantee, certain experiences with the available resources.

6 Conclusions

Service design raises new service ideas by understanding user experiences. Today, research on value co-creation and user experience is focused on a broad, human-centred service design core. Companies can offer customers the chance to interact to encourage value co-creation through the design of experiences. Gamification encourages interaction and activates the emotional states of participants. The link between the emotional

mechanics of gamification and value co-creation can offer a better understanding of how co-creation practices can be enhanced in service design.

In this context, a framework rooted in S-D logic for service design is proposed. The study heeds the appeals of Vargo & Lusch (2017, p. 47) that "for S-D logic to move forward over the next decade, it needs more midrange theory development, as well as evidence-based research". Focusing on co-creation value propositions, the study explores the involvement of users in service design through value co-creation processes, using the emotional mechanics of gamification to create a conducive environment. The mediating role of value co-creation is highlighted. This framework contributes to the new service development process by connecting organisations' managerial practices to gamification and value co-creation and thus providing an understanding of the user experience to generate value propositions.

We draw on S-D logic to argue that gamified services add value-in-use in the form of user experiences that occur through users' interaction with game elements embedded in a service (Vargo & Lusch, 2008). We show that individuals' experiences related to gamified services have immediate consequences for firm-beneficial outcomes. Thereby, we focus on a user-centered perspective to highlight that promoting specific experiences in gamified services can be a powerful approach through which providers are able to co-create value (Hammedi *et al.,* 2017). This perspective complements seminal research that adopted a design-oriented understanding of gamification (e.g., Mekler *et al.,* 2017). Through S-D logic we can understand how emotional mechanics of gamification create value in terms of user experiences (Zomerdijk & Voss, 2010).

6.1 Theoretical contributions

The present study provides a number of theoretical contributions. First, previous studies have demanded new frameworks for service design (Yu & Sangiorgi, 2018). This study contributes to the literature on value co-creation and service design by including the emotional mechanics of gamification as an antecedent in a theoretical framework. The theoretical foundations of S-D logic are operationalised in the proposal of a framework for service design. Although scholars have proposed models to help organisations integrate their service design (Iriarte *et al.,* 2018), no study has considered the importance of the emotional mechanics of gamification in driving service design.

Second, this study helps reduce the gap between the theory and practice of gamification (Seaborn & Fels, 2015; Ostrom *et al.,* 2021), leading to the proposal of this framework. This framework might be applied as a practical tool in customer engagement, combining human-centred design, value-co-creation and user experience. The study makes an initial contribution to better understand how emotional mechanics of gamification can contribute to Service Design, implementing value co-creation perspective. The study thus responds to the calls of Patrício *et al.* (2020) on the benefits of linking gamification and value co-creation and expand the argument towards the benefits of this relationship for service design. Understanding users and their value co-creation processes are key to service design (Patrício et al., 2020) and this study offers a solid theoretical framework to coordinate the integration of resources in service design under the SD Logic. In this way, new ideas on the implementation of service design are contributed to the literature, expanding the theoretical model developed by García-Magro *et al.,* (2022) with the incorporation of service design.

Third, the study establishes a holistic model from the value co-creation perspective to guide managers in service design (Klaus & Edwarson, 2013) and shed light on service design contributions used to reframe new services through a customer-oriented

perspective (Yu & Sangiorgi, 2018). It contributes to extending the Service Design concept from design-activity-centric descriptions to an integrative approach for service innovation. Our framework indicates how gamification can be repositioned as a key element for collaborative service innovation, through value co-creation.

6.2 Practical implications

There is a lack of understanding of how to drive the implementation of service design (Koskela-Huotari et al., 2021). Many managers have identified the need to create value for their customers through experiences, aware of the importance of managing emotional aspects with the same rigor as product management and service functionality (Berry et al., 2002; Mullins & Sabherwal, 2020). The potential to develop a competitive advantage in this complex environment lies in the company's ability to promote voluntary user participation and generate customer engagement (Kumar & Pansari, 2016). However, few studies have explored how to do so. This research does so and provides promising results for further investigation of the potential of the service design approach.

This study contributes to a growing research stream linking Service Design to the S-D logic (Wetter-Edman *et al.,* 2014; Yu & Sangiorgi, 2018), demonstrating how and why Service Design professionals work in a service-/customer-centric logic. Similar to Yu & Sangiorgi (2018), our research focuses on a value co-creation perspective, in this case analysing how emotional mechanics of gamification can transform new service development to better support value-in-use. "While the S-D logic has been critiqued for a lack of practical guidelines to apply the concept to practice" (Yu & Sangiorgi 2018, p. 54), this research provides a concrete framework for organizations' transformational

journey to adopt the S-D logic in service design through emotional mechanics of gamification.

So, at the managerial level, this study contributes to the new service development process by connecting organisations' managerial practices to gamification and value co-creation. Such an approach can provide an understanding of the user experience to generate value propositions. Moreover, user-centred approaches and tools such as gamification can help organisational staff build long-term capabilities to support users' value creation (Yu & Sangiorgi, 2018). Having knowledge and analysing the user experience when using a service can help companies refocus their approaches on service design and promote its implementation.

Technology has made it easier to design experiences to engage users with services. However, simply using technology is not enough to guarantee engagement. The new generation of users is accustomed to using technology and living experiences through technology. Therefore, organisations face the challenge of designing user-experience-centred services that ensure their long-term use.

The success of gamification lies in using game elements that stimulate emotions in users that lead to continued use and engagement. This study shows that the sampled gamified platforms are correctly configured to lead users to the desired behaviour. This finding means that organisations can focus on the power of the emotional mechanics of gamification to engage users not only in value co-creation but also in service design. Together these findings broaden the knowledge base for driving long-term engagement.

This article provides a valuable contribution to organizations that are interested in implementing various forms of innovation, describing how the emotional mechanisms

embedded in a gamified platform stimulate a co-creative environment that is beneficial for service design.

6.3 Limitations and future research

This study has limitations that offer interesting opportunities for future research. First, the context of this study prevents the generalisation of results. Future research should use other contexts to generalise the results reported in this paper. The framework defined in this paper offers a validated starting point for contexts that are different but share similarities in terms of the implications of the emotional mechanics of gamification and elements of value co-creation. The proliferation and use of gamified digital platforms is evidence of this situation. Likewise, increasing the sample size would help generalise the results.

Second, the study is based on cross-sectional data, so it is impossible to determine whether time influences the variables. Therefore, it was not possible to analyse the long-term effects of the emotional mechanics of gamification on individuals. It would be interesting to perform longitudinal studies that would enable analysis of the evolution of the effects of gamification over time and that could thus establish whether the initial impact of the use of apps is sustained or diminishes over time.

Third, only the user perspective was considered. In future research, it would be of interest to include the perceptions of companies and gamified platform providers to analyse the impact of the variables examined in this study in a B2B2C ecosystem.

Fourth, no biases have been considered when implementing gamification, such as those related to the user's profile, the level of familiarity with gamification, and in terms of game elements, specific elements have been associated with emotional mechanics

(rewards for utilitarian emotional mechanics; challenges for hedonic emotional mechanics and social network for social emotional mechanics). Although, in this work the result of implementing gamification through the derived emotional mechanics has been considered directly, in future works interesting research opportunities arise with such considerations.

Finally, although this study examined the influence of value co-creation processes on service design, it would be of interest to adopt a service co-design approach and analyse it jointly with value co-creation processes.

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FIGURES

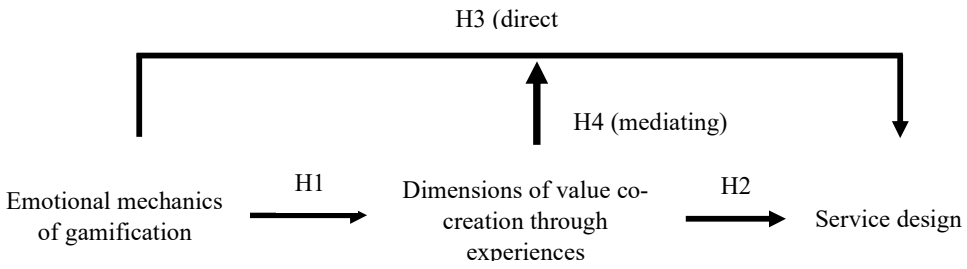

Fig. 1. Theoretical model

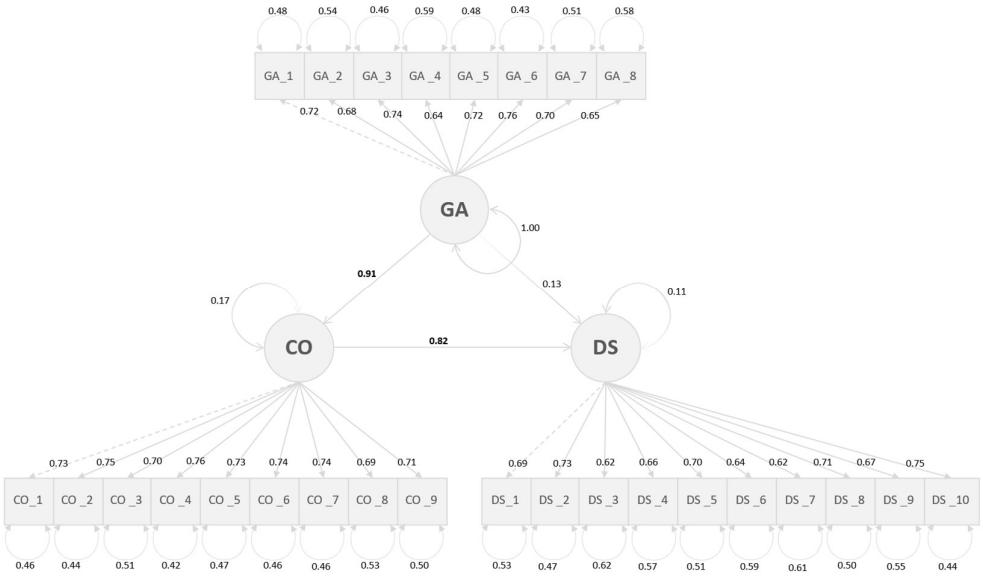

Fig. 2. Graphical non-restricted model.

TABLES

Table 1. Sample profile.

Category		**Percentage (%)**
Gender	Male	52%
	Female	48%
Age	< 20 years	16.1%
	20–29 years	22.4%
	30–39 years	22.0%
	40–49 years	21.1%
	> 50 years	18.4%
Weekly exercise	< 6 times	30.9%
	6–10 times	54.3%
	> 10 times	14.8%

Table 2. Constructs, items, and theoretical sources.

	Emotional Mechanics of Gamification (Adapted from Conaway & Garay, 2014; Liu et al., 2019)
GA_1	When I overcome a challenge, I receive some kind of satisfying reward.
GA_2	Receiving rewards encourages me to continue participating.
GA_3	The more I participate, the more chance I have of receiving a reward.
GA_4	I feel like I get special treatment for using the application.
GA_5	I enjoy overcoming the challenges set by the application.
GA_6	The content offered by the application encourages me to keep participating.
GA_7	The application appeals to me because it lets me compete with other users.
GA_8	I like to share my achievements and progress with other users.
	Co-creation (Adapted from Prahalad & Ramaswamy, 2004; Albinsson et al., 2016)
CO_1	Through the application, I provide information to the company about my tastes and preferences.
CO_2	Through the application, the company actively promotes a dialogue with customers to learn more about their needs, what they want, and how they want it.
CO_3	The application enables the exchange of ideas with other users.
CO_4	The application gives users a range of options to decide how to live the sporting experience.
CO_5	The application provides access to privileged information about new products or company events.
CO_6	The application provides customers with useful information to improve the results of the sports experience.
CO_7	The application gives customers information about the prices of products and services linked to the sports experience.
CO_8	The application allows you to evaluate all the positive and negative factors associated with the sporting experience.
CO_9	The application provides customers with the necessary tools to make fully informed decisions about whether or not to participate in the sports experience
.	
	Design services (Adapted from Balaguer et al., 2008; Sierra et al., 2009; Hariyanto et al., 2020; Xi & Hamari, 2019; Zhou et al., 2022)
DS_1	The application lets me participate in the design of my own experience.

DS_2	The company and I are responsible for the results of my sporting experience.
DS_3	The company and I are in contact to design my sports experience together.
DS_4	Through the application, I feel free to express my ideas and opinions.
DS_5	The application lets me feel like I'm part of a community.
DS_6	I feel like I participate in the design of the service.
DS_7	The design of the application makes me feel like I'm part of the company.
DS_8	The functions of the application are well integrated.
DS_9	The application is easy to use.
DS_10	I like to use the application often.

Table 3. Analysis of the measurement instruments.

Constructs	Cronbach's alpha	Items	EFA final loading	Correlated item-total correlation	Mean	SD	AVE	Construct reliability
Gamification	**0,883**						**0,552**	**0,907**
		GA_1	0,761	0,668	3,84	1,065		
		GA_2	0,728	0,624	4,10	0,988		
		GA_3	0,800	0,712	3,97	1,068		
		GA_4	0,687	0,592	3,62	1,137		
		GA_5	0,767	0,671	4,11	0,979		
		GA_6	0,796	0,708	4.03	0,915		
		GA_7	0,715	0,631	3,85	0,998		
		GA_8	0,679	0,584	3,81	1,119		
Co-creation	**0,909**						**0,580**	**0,925**
		CO_1	0,764	0,693	3,71	1,112		
		CO_2	0,771	0,701	3,70	1,043		
		CO_3	0,737	0,662	3,85	1,019		
		CO_4	0,795	0,725	3,91	0,937		
		CO_5	0,764	0,693	3,81	1,007		
		CO_6	0,769	0,696	3,91	0,944		
		CO_7	0,778	0,706	3,82	0,988		
		CO_8	0,722	0,642	3,83	0,963		
		CO_9	0,752	0,678	3,84	0,941		
Service Design	**0,896**						**0,517**	**0,914**
		DS_1	0,711	0,628	3,81	0,965		
		DS_2	0,757	0,684	3,81	1,055		
		DS_3	0,691	0,615	3,52	1,099		
		DS_4	0,709	0,632	3,75	1,016		
		DS_5	0,731	0,652	3,88	1,013		
		DS_6	0,731	0,661	3,57	1,094		
		DS_7	0,706	0,632	3,66	1,082		
		DS_8	0,748	0,670	3,92	1,006		
		DS_9	0,655	0,562	4,11	0,957		
		DS_10	0,743	0,661	4,03	0,998		

Table 4. Measurement model parameters.

Construct	Item	Est.	SE	z	p	CI (lower)	CI (upper)	std (all)
GA	GA_1	1.000	0.000			1.000	1.000	**0.719**
	GA_2	0.872	0.077	11.316	< .001	0.724	1.031	**0.676**
	GA_3	1.029	0.077	13.400	< .001	0.888	1.194	**0.738**
	GA_4	0.952	0.094	10.142	< .001	0.786	1.146	**0.641**
	GA_5	0.920	0.075	12.262	< .001	0.774	1.071	**0.719**
	GA_6	0.903	0.080	11.227	< .001	0.752	1.078	**0.756**
	GA_7	0.908	0.092	9.844	< .001	0.742	1.113	**0.697**
	GA_8	0.943	0.105	8.999	< .001	0.758	1.171	**0.645**
CO	CO_1	1.000	0.000			1.000	1.000	**0.733**
	CO_2	0.954	0.063	15.032	< .001	0.833	1.091	**0.745**
	CO_3	0.879	0.061	14.493	< .001	0.759	0.998	**0.703**
	CO_4	0.876	0.070	12.515	< .001	0.743	1.022	**0.762**
	CO_5	0.899	0.063	14.236	< .001	0.768	1.031	**0.727**
	CO_6	0.852	0.059	14.390	< .001	0.740	0.968	**0.735**
	CO_7	0.892	0.069	12.920	< .001	0.752	1.033	**0.735**
	CO_8	0.812	0.065	12.454	< .001	0.678	0.937	**0.687**
	CO_9	0.818	0.064	12.829	< .001	0.690	0.941	**0.708**
DS	DS_1	1.000	0.000			1.000	1.000	**0.688**
	DS_2	1.154	0.096	11.963	< .001	0.982	1.360	**0.726**
	DS_3	1.023	0.118	8.678	< .001	0.824	1.286	**0.618**
	DS_4	1.007	0.116	8.710	< .001	0.809	1.261	**0.658**
	DS_5	1.065	0.112	9.470	< .001	0.875	1.312	**0.698**
	DS_6	1.056	0.111	9.513	< .001	0.870	1.318	**0.641**
	DS_7	1.011	0.118	8.534	< .001	0.804	1.272	**0.621**
	DS_8	1.072	0.087	12.314	< .001	0.903	1.248	**0.707**
	DS_9	0.964	0.088	10.989	< .001	0.797	1.141	**0.669**
	DS_10	1.129	0.093	12.207	< .001	0.954	1.308	**0.751**

*std (all) represents the standardized estimate for the whole model (ranging from -1 to 1).

Table 5. Unconstrained model goodness-of-fit measures.

Goodness of fit measures	Acceptable Fit Index	Value obtained
Absolute Fit Index		
RMSEA	≤0.05	0.039
Lower 90% CI		0.036
Upper 90% CI		0.042
RMR	≤0.05	0.030
Incremental Fit Index		
NNFI	≥0.9	0.881
CFI	≥0.9	0.906
IFI	≥0.9	0.906

Table 6. Parameters and effects associated with the structural model without restrictions.

Link	Hip.	Parameter	Est.	SE	z	p	CI (lower)	CI (upper)	std (all)
GA->CO	H1	alpha	0.971	0.084	11.606	< .001	0.825	1.150	**0.913**
GA->DS	H3*	direct	0.112	0.157	0.713	0.476	-0.257	0.382	**0.129**
CO->DS	H2	beta	0.671	0.146	4.586	< .001	0.450	1.009	**0.823**
Effects	**Hip.**	**Label**	**Est.**	**SE**	**z**	**p**	**CI (lower)**	**CI (upper)**	**std (all)**
Indirecto	H4	alpha*beta	0.652	0.147	4.436	< .001	0.443	1.025	**0.752**
Total	H4	indirect+direct	0.764	0.073	10.452	< .001	0.631	0.918	**0.881**
Proporcion	H4	indirect/total	0.854	0.200	4.276	< .001	0.556	1.351	**0.854**

*std (all) represents the standardized estimate for the whole model.

Table 7. Parameters and effects associated with the direct and indirect simple structural model.

Direct Simple Model	Hip.	Parameter	Est.	SE	z	p	CI (lower)	CI (upper)	std (all)
GA->DS	H3	direct	0.752	0.074	10.146	< .001	0.602	0.904	**0.877**
Indirect Simple Model	**Hip.**	**Parameter**	**Est.**	**SE**	**z**	**p**	**CI (lower)**	**CI (upper)**	**std (all)**
GA->CO	H1	alpha	0.977	0.083	11.805	< .001	0.821	1.146	**0.920**
CO->DS	H2	beta	0.772	0.069	11.237	< .001	0.641	0.913	**0.946**
Indirecto	H4	alpha*beta	0.754	0.068	11.016	< .001	0.624	0.901	**0.870**

*std (all) represents the standardized estimate for the whole model.