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Beyond Reality: The Role of Innovation in Virtual Sport Events

Daniel Martinez-Cevallos[1], Mario Alguacil Jimenez[2], Carlos Perez Campos[3], Ferran Calabuig[2]

[1]*Central University of Ecuador*
Universitaria Avenue, 170129, Quito, Ecuador
E-mail. martinezcevallos1988@gmail.com

[2]*University of Valencia*
Gasco Oliag, 3, 46010 Valencia, Spain
E-mail. mario.alguacil@uv.es, ferran.calabuig@uv.es

[3]*Catholic University of Valencia*
Sacre Cor, 5, 46113, Godella, Spain
E-mail. carlos.perez@ucv.es

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With the arrival of Pandemic COVID, most sporting events were suspended, including popular foot races, known for their massification and occupation of public space. This global situation forced sporting events to innovate to become safer and to continue offering their activities despite the restrictions. From this evolution, virtual editions of many events emerged and promoted a new format that is still in force. The present study addresses the role of innovation from three perspectives: service newness in the market, incremental service innovation and technology-focused innovation, to subsequently explain the perceived quality, perceived value and satisfaction with the event. The sample was 560 participants of the Medellin Virtual Marathon. Results show that incremental service innovation and technology-focused innovativeness are important to explain perceived quality, while newness in the market is not. Subsequently, quality influences value and value influences satisfaction. Therefore, innovation must be considered in the management of virtual sporting events.

Keywords: *Innovation; Sporting Events; Quality; Value; Satisfaction.*

Introduction

In the contemporary business environment, service companies need to constantly update their methods and propositions in order to remain competitive (Thakur & Hale, 2013). Service innovation drives economic growth and is found in all areas of service. In the last decade, prior to the global humanitarian crisis, generated by Covid-19, service companies have experienced significant growth due to their focus on innovation (Snyder *et al.*, 2016). But, with the advent of the global health crisis, there were repercussions on society at macro, meso and micro levels, having unprecedented social and economic consequences (Finsterwalder & Kuppelwieser, 2020).

Tackling this crisis required an approach that involved both the improvement of existing services and the creation of new services. The pandemic sparked exceptional interest in innovation, including calls to encourage, initiate, and coordinate innovations beyond those already conceived and implemented (Heinonen, & Strandvik, 2021). Likewise, companies are often confronted with radical transformations in their operating environment that unfold gradually and have uneven impacts, as is the case with digitalization (Grover & Sabberwal, 2020).

Within this crisis, the sports industry was involved, specifically foot races, which are participatory sporting events, characterized by their main focus on promoting mass participation of individuals, with a more notable emphasis on the generation of commitment by participants than on the sporting outcome itself (Coleman & Ramchandani, 2010). These events, following the outbreak of the COVID-19 pandemic, were transformed into virtual experiences which were developed through platforms (Kim et al., 2023). This transition occurred in response to the uncertainty generated among the various stakeholders, which motivated the need to explore new markets and offer viable alternatives in terms of both training and health. In addition, this adaptation also helped to mitigate potential losses for professional athletes by providing them with continued opportunities for participation and development in a safe and virtual environment (Westmattelmann *et al.*, 2021).

For their part, Helsen et al. (2022) mention that the concept of virtual sporting events encompasses various modalities. It ranges from individual tracking of sporting activities at times and places chosen by the user, with subsequent uploading of data to an online platform to create leader boards (such as the Strava challenge), to actively participating at a predefined date and time, with real-time information, live leader boards and data about the environment (such as the MyTrace application). It also involves participation in a specific location linked to an online platform, where participants can interact virtually with others who are in different locations simultaneously, such as in Zwift events.

All of these virtual events opened the field, in most countries, when the pandemic led to government restrictions that resulted in the cancellation of such participatory (face-

to-face) sporting events, including those that traditionally generated large crowds of people, such as foot races (Helsen *et al.,* 2022). These measures reflect the need to prioritize public health and minimize the risks of virus spread in situations of high crowds. Furthermore, they highlight the challenges faced by both event organizers and participants in adapting to this new landscape and finding innovative alternatives to keep the sporting experience alive in a safe environment.

Thus, an evolution of traditional face-to-face events towards more innovative and compelling experiences has been generated, this change was developed through the adoption of various virtual experience platforms and technologies (Woyo & Nyamandi, 2022). These virtual solutions not only allowed the continuity of significant events to be maintained, but also opened up new creative and interaction possibilities for organizers and participants. Furthermore, the transition to virtual experiences highlights the importance of adaptation and resilience in an ever-changing world, while also underscoring the need to consider emerging digital trends in the planning for future events (Kim *et al.*, 2023).

Despite the rise of these virtual sporting events in response to the growing demand, and despite the fact that these types of events have continued to be produced after the pandemic, there is scarce scientific literature that analyzes this context. This lack of literature means that, for instance, in the case of sporting events, we cannot reliably know what aspects may be different in the user experience compared to face-to-face events, or to what extent the innovation carried out by event organizers could influence consumer behavior. With the idea of bringing contrasted information to this field and to see how service innovation may or may not be influential in variables that are key for companies that manage sporting events, the present research was conducted.

In view of the above, in a more concrete way, the objective of this study focuses on the evaluation of whether the perception of innovation in the Medellín Virtual Marathon translates into an improvement in the quality perceived by the participants. Subsequently, the aim is to assess whether the relationship between perceived quality, perceived value and satisfaction, which has been supported in the marketing literature (Gallarza *et al.,* 2013) also occurs in the case of a virtual sporting event. To achieve this, a structural equation model is used, allowing a comprehensive analysis of how perceived innovation can influence the experience of participants and their level of satisfaction, providing a deeper understanding of the factors that influence the perception of quality and value in virtual events.

Theoretical Background

Innovation

According to Miles (2010), innovation plays an essential role in increasing the quality of life and strengthening the competitiveness of industry. For Schumpeter (1934), innovation is the engine of economic progress. He distinguishes between inventing and innovating and argues that inventions have no value in themselves. He also defines innovation as a distinct activity in which inventions are applied to the market for commercial purposes. Thus, an invention only becomes an innovation if it is introduced into the market and generates a significant benefit. Schumpeter highlights the importance of differentiating the process of creating a new offering from the result or commercialization of this (Snyder *et al.,* 2016). On the other hand, some authors indicate that the innovation capability of entities can be divided into product innovation and process innovation, although these aspects are so close that other authors propose to study innovation capability as a whole (Mendoza-Silva, 2021). Likewise, in the field of sports organizations, innovation is positioned as a tool of great importance, fundamental for competitiveness and, moreover, crucial to survive in the challenging environments in which these organizations operate (Tjonndal, 2016). Despite the importance innovation seems to have in today's world, such innovation also implies efforts for organizations. This is especially relevant for small entities that want to organize events, since small firms are conditioned by access to resources and capabilities, limiting their capacity to innovate (Soetanto & Demir, 2023).

Based on Schumpeter's (1934) vision, service innovation refers to the introduction of a new service or the improvement of an existing one that is implemented and brings advantages to the organization that created it. These advantages usually derive from the additional value that the improvement offers to customers. Therefore, it is argued that an innovation must be original both for the innovator and for a wider group of stakeholders (Toivonen & Tuominen, 2009).

Although some studies used a more general description to define the concept of service innovation, such as those mentioned above, other studies include several dimensions/categories to define this concept (Gallouj & Weinstein, 1997). Within this context, the modification of various dimensions is used to conceptualize service innovation, such as the Lancasterian view, which defines it through characteristics centered on the supplier, customer, technical aspects and the service received by the end user (Saviotti & Metcalfe, 1984), which generally implies that there are multiple changes in an already existing offer. In this sense, the fact that there are numerous dimensions suggests that the notion of service innovation is evolving into a more encompassing concept, which in turn indicates that firms may be more innovative than previous research has indicated (Snyder *et al.,* 2016).

Conventional classifications of service innovation distinguish between radical and incremental innovations (Gallouj & Weinstein, 1997) as well as innovations related to products and processes (Vaux Halliday & Trott, 2010). More current classifications, suggest that service innovation departs from traditional views of innovation in terms of factors such as the evolving role of the customer (Michel *et al.,* 2008), the influence of the Internet (Dotzel *et al.,* 2013) and the emergence of new business approaches (Hsieh *et al.,* 2013). Despite the existence of several dimensions in the literature, Gallouj and Savona (2008), raise questions about the current classifications and propose the importance of developing new categories to achieve a deeper understanding of the essence of service innovation.

Following the perspective of Gallouj and Savona (2008), it is important to recognize that service innovation can encompass changes in several dimensions of an existing

service. Therefore, the creation of various categories to understand innovation more comprehensively becomes a crucial factor. In this context, we will explore the following dimensions in later sections: service newness in the market, incremental service innovation, and technology-focused innovativeness.

Newness of the Service in the Market

The Newness of the service in the market (hereinafter: NMS) represents consumers' perception of a new service offered by an organization, services that can provide new ways of interacting with the companies that offer them (Nyadzayo *et al.,* 2023). This NMS is characterized by technological innovation in the delivery process and its potential to introduce new proposals in the market (Avlonitis et al., 2001). Newness is a key factor affecting the survival or early failure of start-ups, according to numerous studies conducted over decades (Aldrich, 2011; Bruton *et al.,* 2010). The concept of newness has been scientifically validated from a conceptual (Yamada, 2004) and analytical perspective (Cheng & Low, 2006; Poon *et al.,* 2009), which implies the need for empirical evidence to support it. In emerging markets, there is the possibility of creating attractive services for consumers, and virtual sporting events have the capacity to do so, due to the flexibility and customization that technology allows. For entities that are starting out in this type of innovation, entrepreneurial marketing towards exploratory innovation is interesting, since in turbulent markets, such as an emerging one, it has proven to be useful (Buccieri et al., 2023). This exploratory Innovation refers to disruption and discovery that generate advanced product and service designs (Kyriakopoulos & Moorman, 2004). Exploratory innovation involves the creation of new offerings and business models that shape ecosystems (Schoemaker et al., 2018). The creation of these virtual sporting events will be shaping the market, creating diversifications for all the variety of activities and target audiences that this context allows.

On the other hand, within these emerging markets the perception of product scarcity has been shown to significantly influence consumer decisions (Hamilton *et al.,* 2019). Although it is recognized that scarcity increases the relevance of unavailable goods (Verhallen & Robben, 1994), the scientific literature has pointed out that product scarcity, as opposed to resource scarcity, can have two opposite effects. On the one hand, it can increase the perceived value of scarce products (Cialdini, 1993), making them more attractive to consumers. On the other hand, scarcity can also decrease the importance of the purchase context, implying that consumers may pay less attention to factors such as environment or situation when making purchase decisions (Shah *et al.,* 2015).

Thus, innovation has established itself as a critical factor for the survival of companies in the market, as has been pointed out in previous studies (Francis & Bessant, 2005). Consequently, firms have a need to generate newness, whether in the form of higher quality products, innovative production methods, new raw materials, forays into novel markets, or organizational restructuring (Hill & Jones, 1998; Autio *et al.,* 2014). This innovation imperative reflects the belief that a firm's ability to constantly adapt and evolve is essential to its success and continuity in a constantly changing business environment. Therefore, it can be hypothesized that companies in the sporting events industry, in times of pandemic chose to offer new services and products to avoid losing attention on their services and survive in difficult times.

Previous research has also focused on factors affecting product quality, particularly with regard to the effects of innovation on the creation of new and distinctive products, as well as on production processes (Dettori, 2020). This approach has elicited numerous studies supporting the existence of a positive relationship between product quality and innovation (Dewhurst *et al.,* 1999; Honarpour *et al.,* 2018; Imai & Baba, 1989; McAdam & Armstrong, 2001; Prajogo & Sohal, 2001). Therefore, considering all this background, H1 is born in the present study: the newness of the service provided by the Medellín Virtual Marathon, influences the perceived quality of the participants of the event.

Incremental Service Innovation

To specify the concept of Incremental service innovation (hereinafter: ISI), it is necessary to distinguish between radical and incremental types of service innovation. Radical service innovation consists in creating a new offer that has no elements in common with the previous one (Gallouj & Weinstein, 1997). This implies that customers must acquire new competencies to co-create value with the offering (Snyder et al., 2016). ISI, on the other hand, refers to defined changes in the characteristics presented by products or services. New elements are attached to the services provided by the organization, without altering the service generally provided (Gallouj & Weinstein, 1997). This incremental innovation results from inheritance, modification and construction activities based on the platforms available in the entity, so it is not as expensive and risky as radical innovation (Gui *et al.,* 2022). Therefore, a radical innovation is new to the market, while an incremental innovation is new to the entity (Snyder et al., 2016). Frequently, these developments involve the active participation of customers and are applicable to both newly established and existing services (Oke, 2007). In addition, it should be noted that an incremental innovation proposed by an entity may be perceived as radical by the customer or vice versa, since the innovative nature of a product is a relative concept (Raddats *et al.,* 2022). The number of existing offerings in that particular field and the degree of users' experience in consuming that type of product will also define how they perceive innovations. On the other hand, this relationship between company and customer in terms of incremental innovation will also be influenced by the size of the company, since larger companies obtain greater benefits from incremental product innovation (Noone *et al.,* 2024).

Incremental Service Innovation (ISI) is characterized as a strategy aimed at generating additional value by leveraging existing services. Its fundamental concept is based on mutual collaboration and adaptation between service providers and customers, allowing them to develop more effective solutions compared to existing ones (Möller *et al.,* 2008). This approach is clearly illustrated by the additional services offered by some sports organizations,

such as virtual racing, where its constant quest to improve the customer experience is evidenced.

In this context, the combination of technological resources has been observed to improve service performance by incorporating features previously existing in the market (Myhren *et al.,* 2018). This is known as incremental services, which involve the addition of technological components to already existing services, with appropriate adaptations (Ottenbacher & Harrington, 2010). In addition, quality management has shown a significant relationship with incremental innovation (Escrig-Tena *et al.,* 2021). Considering this background, hypothesis H2: The incremental service innovation implemented by the Medellín Virtual Marathon influences the perceived quality of event participants.

Technology-Focused Innovation Capability

Next, we find the concept of Technology-focused innovation capability (hereinafter: TFIC). The interrelation between technological innovations and the essence of organizational activity has been a topic of considerable interest in the academic literature (Camisón & Monfort-Mir, 2012). Nowadays, with the technological rise that has been experienced at a social level and that has also involved sports services and events, technological innovation is one of the mandatory aspects to try to compete in an increasingly saturated market. For instance, aspects such as artificial intelligence, unknown not so long ago, are elements that must already be considered in relation to the service's capability for innovation (Akter *et al.,* 2023). These innovations, which involve transformations in products, procedures and operating systems, together with the adoption of advanced technologies and physical resources for production, are an essential component in the strategy of modern companies to remain competitive in the market. This advancements in technology and self-service technology allow customers to interact with service providers more efficiently and effectively (Nyadzayo *et al.,* 2023). In this context, it is clear that the capacity for technology-driven innovation is a factor of growing importance (Hogan *et al.,* 2011). This notion is part of an ongoing effort by researchers to understand and disaggregate more precisely the dimensions of innovation. In response to Lawson and Samnson's (2001) earlier call, Hogan et al. (2011), have contributed significantly to the field, exploring and clarifying various aspects of technological innovation. This approach enriches our appreciation of innovation itself and its influence on contemporary organizations.

On the other hand, within the sports industry, Ratten (2020), mentions that technology plays a fundamental role and is constantly evolving in a wide range of contexts, spanning from the realm of amateur sportsperson (runners on foot) to that of professional athletes, and extends both on and off the field of play. These technological advances are constantly transforming and developing, underscoring their continuing importance in the world of sport. However, over the decades, the world of sport has maintained a close relationship with new technologies, resulting in significant changes in both the organization of sporting events and the nature of competition itself (Byers *et al.,* 2021). In this context, Mallen (2019) has identified historical examples of this phenomenon, ranging from the development of the wheelchair to more recent advances such as exoskeleton technology and improvements in the characteristics of golf balls. These examples highlight how technology has influenced and continues to influence the evolution of sport over time.

Thus, it is evident that technology is becoming increasingly important as a critical factor in global competitiveness within the sports industry. However, despite the fact that technological innovation has been widely addressed by the media, divergent opinions persist on its relevance in the sports context, (Ratten, 2020). This discrepancy is not limited to the sport domain, as it extends to other areas, such as the perception that service companies are often considered less technologically innovative compared to manufacturing industries (Camison & Monfort-Mir, 2012).

On the other hand, previous research, such as that of (Miah, 2005), has highlighted that traditional sport management theory and technology, in general, have shown a tendency to remain isolated, lacking a coherent connection. This is despite the presence of technology in the sport domain and the significant impact it has exerted on the industry (Miragaia *et al.,* 2017). Currently, the literature related to technology in sport is in an early stage of theoretical development, but it is imperative that this dynamic evolves. Technology must be established as the fundamental foundation in any research related to innovation in sport (Ratten, 2020). Therefore, in this study, we seek to address the deficiencies identified in the literature by presenting the following hypothesis H3: The innovation capacity focused on the technology implemented by the Medellín Virtual Marathon influences the perceived quality of the participants of the event.

Perceived Quality

The concept of perceived quality and its link to variables such as perceived value and satisfaction is an aspect that has been studied in depth in the scientific literature on sport and tourism (Shyju *et al.,* 2023). The literature postulates that service quality is conditioned by the discrepancy between customer expectations about a company's performance and the actual evaluation of the product or service they receive (Parasuraman et al., 1988). Martinez and Martinez (2009) highlight that the most widely accepted definitions are the following: "the consumer's judgment of the excellence or superiority of a product or service" (Zeithaml, 1988, p. 3), and also, "the consumer's overall impression of the relative superiority or inferiority of an organization and its services" (Bitner & Hubber, 1994, p. 7).

On the other hand, perceived quality, in a specific context, represents a particularly important cognitive component that exerts a significant influence on customer satisfaction in relation to product selection. The interaction between perceived quality, the value the customer attributes to the product and pre-existing expectations about quality plays a crucial role in determining consumer choice among alternative products (Farr-Wharton *et al.,* 2014; Frank *et al.,* 2014). This evaluation and selection process is fundamental

in purchase decision making. Therefore, customer buying behaviour, it can be said, is a state of mind that is influenced by several factors, such as product innovation, lifestyle, and how they perceive quality (Schiffman & Kanuk, 2007; Yang *et al.*, 2019).

Within the sports industry, despite the abundance of research on quality in sporting events, its focus is relatively new to the field. Given that sporting events are a global enterprise and that the organizations in charge feel the need to better understand these aspects, it has become essential for their management. Alonso and Segado (2015) emphasize the importance of measuring the quality perceived by consumers in sport services as an essential element for effective management. Furthermore, in the sports field quality have been found to be crucial to explain satisfaction (Calabuig *et al.*, 2010; Cuesta-Valino *et al.*, 2023). In the specific case of sporting events, this quality is key to explain the perceived value and satisfaction of the sporting event (Jeong & Kim, 2020). In view of this, we propose the following hypothesis H4: The quality perceived by participants in the Medellín Virtual Marathon influences the perceived value of the event.

Perceived Value

Perceived value is a variable that has been studied in the sports field due to its importance in itself as well as its influence on key variables for success (Biscaia et al., 2023; Calabuig *et al.*, 2016; Jeong & Kim, 2020). Perceived value has also shown to have a mediating effect between management variables and future intentions in the Sport field (Wang & Chiu, 2023). The definition of perceived value proposed by Zeithaml (1988) has gained wide acceptance and is understood as the overall valuation that a consumer makes of the usefulness of a product. This valuation is based firstly on the perception of what he gets from the product and secondly on what he has given to obtain it. In other words, perceived value refers to the overall judgment a customer makes about the usefulness of a product, considering both what he receives and what he sacrifices to acquire it.

Parasuraman (1997) argues that perceived value is a subjective concept since its appreciation varies from one customer to another. He stresses the importance of having valid and reliable tools to measure customers' perceived value. The lack of such tools would hinder the formulation of strategies aimed at this construct, which, in turn, would limit their effective implementation. An accurate measurement of perceived value would make it possible to assess whether the strategies implemented influence customer perceptions of value and, therefore, outcomes such as purchase intentions, loyalty and sales, among others.

Previous research has indicated that perceived value represents the main factor preceding satisfaction and behavioral intentions (Cronin *et al.*, 2000; Kim & Thapa, 2018). In the field of sporting events, perceived value has been shown to be an influential factor for both satisfaction with the event and participants' future intentions (Jeong & Kim, 2023; Xiao *et al.*, 2020). Therefore, the following H5: The perceived value of the participants of the Medellín Virtual Marathon, influences event satisfaction.

Satisfaction

In the conceptualization of satisfaction, we find Oliver (1981), who describes it as the evaluation of the surprise inherent in the acquisition of a product and the consumption experience itself. For this author, satisfaction is understood as an emotional experience. Fornell (1992), on the other hand, conceives satisfaction as an overall evaluation made by the consumer after completing a purchase. This perspective coincides with that of Olsen, Wilcox and Olsson (2005), who define it as a state of general feelings towards a product or service.

On the other hand, Llorens and Fuentes (2000) emphasize that high customer satisfaction is a fundamental indicator of business success. This is because satisfaction, in any context, including sport, has a very important influence on participants' future intentions (Garcia-Pascual *et al.*, 2023). This perspective has led companies to incorporate increasingly higher levels of satisfaction as essential criteria for evaluating the performance of their products and services. Furthermore, they emphasize that the fundamental basis of total quality lies in customer-centricity. Customer satisfaction is considered an essential requirement for long-term success in an organization.

In the context of sporting events, satisfaction is understood as a pleasant and positive experience during participation in the competition and the use of related services (Yoshida & James, 2010). In the sport domain, there is a growing interest in studying consumer satisfaction in relation to sport products or services (Alonso-Dos Santos *et al.*, 2024), encompassing both positive (satisfaction) and negative (dissatisfaction) judgments. Despite this, most theories focus on the evaluation of positive aspects. Consequently, numerous studies have been conducted focusing on various areas, such as both public and private sports centres, as well as public participation in sporting events (Elasri *et al.*, 2013, Jeong & Kim, 2020).

Relationship between Perceived Quality, Perceived Value, and Satisfaction

Within the study of these variables, it has been observed that perceived quality and user satisfaction are closely related variables, both based on the user's evaluation when comparing their service experience with their previous expectations (Dettori, 2020). These relationships have been the subject of study not only in terms of perceived quality and satisfaction, but also in the linkage between perceived quality and perceived value (Cobelli *et al.*, 2019), as well as between perceived value and customer/user satisfaction (El-Adly, 2019; Jeong & Kim, 2020). In the sports context, perceived value has been shown to be influential in explaining satisfaction and future intentions, in the same way that satisfaction has been shown to be influential in explaining future intentions (Garcia-Pascual *et al.*, 2023). This underlines the importance of the customer's point of view when evaluating how he/she has received services from an organization (Alen & Fraiz, 2006). In addition, the interaction of the three variables, perceived quality, perceived value and satisfaction, as a chain of influences, has been investigated (Gallarza et al., 2013), finding a close relationship and significant influence between them

(Garcia-Pascual *et al.*, 2023; Howat & Assaker, 2013; Husna & Novita, 2020; Tran & Le, 2020).

Method

Sample

The sample of the study corresponds to the participants of the Medellín Virtual Marathon. The total number of valid surveys obtained in the study was 560, for a total population of 1600 participants. This amount of sample collected, allows us to work with a sampling error of 3%. Regarding the general characteristics of the sample, of the total number of respondents, 61.4% (n= 361) were men, while the remaining 33.8% (n= 199) were women.

Instrument

To obtain the necessary information for the study, a questionnaire was created consisting of the different variables of interest. The first of these variables was the innovation scale, which was divided into the three types of innovation to be measured. The first of these innovations was newness of service to the market (NMS) following the proposal of Avlonitis et al. (2001). The second type of innovation that was part of the questionnaire was the Incremental Service Innovation (ISI) obtained from the contribution of McDermott & Prajogo (2012) while, finally, the items corresponding to the Technology Focused Innovativeness (TFIC) were obtained from Hogan et al. (2011). On the other hand, the quality scale was obtained from Oliver (1993), while the perceived value scale was that proposed by Zeithaml (1988) and, finally, the satisfaction scale was that of Hightower et al. (2002). Subsequently, in the results section, the wording of each of the items in each of the variables can be seen.

Procedure

To collect all the necessary information for the study, we first contacted the event organizers to explain the purpose of the research and to determine their willingness to participate in the study. Once they confirmed their participation, the survey was sent to them in electronic format, since they were to be the ones to send it to those registered for the event. Subsequently, the organization sent the survey to the participants of the event, explaining the purpose of the research as well as the anonymous nature and the exclusively scientific and academic use of the data. Once the survey was sent, a two-week margin was left for people to answer. After this time, and having obtained a considerable sample, we proceeded to download the data to begin processing them.

Statistical Analysis

The structural model analysis was performed with the EQS 6.4 program. To this end, the six factors forming the model were introduced, each with its corresponding items. Once they were all introduced, we proceeded to establish the relationships between variables that had to be tested, in order to verify whether the proposed influences were significantly confirmed or not. Each of these proposed relationships forms the hypotheses that have been contrasted in the study.

Results

Firstly, in relation to the descriptive values of the dimensions that compose the study (see table 1), these are, firstly, the 3 dimensions related to innovation: Newness of the service in the market, Incremental service innovation, and Technology-focused innovation capability. Subsequently, we also found the variables of perceived quality, perceived value and satisfaction. As can be seen, the average value of these dimensions is well above the neutral point of 3, so that they clearly tend towards a positive evaluation. In this sense, the lowest rating is 4.08 (±1.04) in the innovation dimension related to the newness of the service in the market, while the highest rating appears in satisfaction (4.71 ±.67).

Table 1

Descriptive Variables of the Study Variables

Variable	M	SD
NSM	4.08	1.04
ISI	4.32	.89
TFIC	4.13	1.00
Perceived Quality	4.60	.73
Perceived value	4.45	.76
Satisfaction	4.71	.67

Note. M= mean; SD= standard deviation; NMS= Newness of the service in the market; ISI= Incremental service innovation; TFIC= Technology-focused innovation capability.

On the other hand, looking in more detail at the dimensions, below we see the descriptive results of each of the items that make up each scale (see Table 2). As can be seen, the highest mean value in this case corresponds to the items "the decision to participate in the Medellín Virtual Marathon was the right one" (4.73 ±.68) and "I really enjoyed participating in the Medellín Virtual Marathon" (4.73 ±.69), both corresponding to the dimension of satisfaction with the brand. On the other hand, the lowest mean rating, which despite being the lowest is close to value 4, appears in the item "The service offered by the Medellín Virtual Marathon required a change in my purchasing behaviour" (3.98 ±1.23) corresponding to the innovation dimension related to the newness of the service in the market.

Table 2

Description of the Items that Compose the Study Variables

Variable	Item	M	SD
NMS	The service offered by the Medellín Virtual Marathon was totally new in the market	4.07	1.16
NMS	The service offered by the Medellín Virtual Marathon offered new features compared to the competition	4.19	1.05
NMS	The service offered by the Medellín Virtual Marathon required a change in my buying behavior (i.e., the way I bought and used it)	3.98	1.23
ISI	I consider that the Medellín Virtual Marathon improves and promotes existing services	4.36	.90
ISI	I consider that the Medellín Virtual Marathon introduces improved versions of existing services to the local market	4.30	.97
ISI	I consider that the Medellín Virtual Marathon expands services for existing participants	4.31	.94
TFIC	I consider that the Medellín Virtual Marathon innovates with new software	4.11	1.09
TFIC	I consider that the Medellín Virtual Marathon adopts the latest industry technology	4.15	1.00
TFIC	I consider that the Medellín Virtual Marathon innovates with new technology	4.15	1.04
TFIC	I consider that the Medellín Virtual Marathon introduces new integrated systems and technology	4.13	1.04
TFIC	I consider that the Medellín Virtual Marathon innovates with its software/technology to stay ahead of the market	4.12	1.05
PQ	In general, I have received high quality service at the Medellín Virtual Marathon	4.63	.74
PQ	Generally speaking, the service offered at the Medellín Virtual Marathon is excellent	4.62	.74
PQ	Generally speaking, the service offered at the Medellín Virtual Marathon is superior	4.55	.82
PV	The programs and services at this event have great value	4.51	.83
PV	The programs and services at this event are worth what they cost	4.51	.80
PV	What I get from this event and what it costs provides value to me	4.51	.82
PV	In general, the value of the programs and services at this event is high	4.27	1.01
ST	I am happy with the experiences I have had in the Medellín Virtual Marathon	4.67	.73
ST	The decision to participate in the Medellín Virtual Marathon was the right one	4.73	.68
ST	I have truly enjoyed participating in the Medellín Virtual Marathon	4.73	.69

Note. M= mean; SD= standard deviation; NMS= Newness of the service in the market; ISI= Incremental service innovation; TFIC= Technology-focused innovation capability; PQ= perceived quality, PV= perceived value; ST= satisfaction.

Measurement Model, Reliability and Validity Analysis

First, a confirmatory factor analysis was conducted with the set of variables that make up the study. The purpose of this analysis was to confirm the suitability of the different scales proposed in the measurement, as well as to ensure adequate psychometric properties that would allow the measurement to be considered reliable and valid. The results of this confirmatory factor analysis (see Table 3) indicate that the measurement model has an adequate fit both in the maximum likelihood model (x2/df = 4.35, RMSEA = .08, NFI = .96, NNFI = .96, CFI = .97, IFI = .97) as in the robust model (x2/df = 1.95, RMSEA = .04, NFI = .92, NNFI = .95, CFI = .96, IFI = .96). where the ratio of chi-square and degrees of freedom is below 5 in the maximum likelihood case and below 3 in the robust case (Byrne, 2013). The fit indices exceed in all cases the value of .90 (Hu & Bentler, 1999) and the RMSEA value falls below .08 (Browne & Cudeck, 1993). Once the adequacy of the model was assured, we proceeded to confirm the parameters related to the reliability and validity of the scales. First, regarding reliability, in Table 3 we can see how in all cases, the different dimensions show Composite Reliability and Cronbach's alpha values above .90 (Hair et al., 2006) and AVE values above .50 (Fornell & Larcker, 1981). Regarding convergent validity, we see that the factor loadings of the items in their dimension are higher in all cases to the value of .60 (Bagozzi & Yi 1988), with R2 values in each item able to explain more than 16 % of the variance of the variable (Pituch & Stevens, 2016) and with significant T-statistic values higher than 1.96 (Veasna et al., 2013).

Table 3

Indicators of Reliability and Convergent Validity

Construct	Item	β	T	R^2	Construct	Item	β	T	R^2
NSM (F1)	1	.89	6.24*	.78	PQ (F4)	12	.95	5.16*	.90
CR=.90, AVE=.76	2	.96	6.56*	.92	CR=.95, AVE=.87	13	.96	6.08*	.92
α= .89	3	.75	8.43*	.56	α= .95	14	.89	4.34*	.80
	4	.92	7.49*	.84		15	.79	4.67*	.62
ISI (F2)	5	.95	5.91*	.90	PV (F5)	16	.94	6.81*	.89
CR=.95, AVE=.87					CR=.91, AVE=.71				
α= .95	6	.93	6.01*	.86	α= .90	17	.93	5.31*	.86
						18	.68	7.45*	.46
	7	.90	6.21*	.81					
TFIC (F3)	8	.94	6.66*	.89	ST (F6)	19	.93	5.36*	.87
CR=.96, AVE=.83	9	.98	6.02*	.95	CR=.95, AVE=.87	20	.94	2.59*	.89
α= .98	10	.97	5.70*	.95	α= .95	21	.93	4.14*	.87
	11	.97	7.14*	.94					

*Nota. CR= composite reliability; AVE= average variance extracted; β= standardized beta value; T= T-statistic value; α= Cronbach's Alpha; NMS= Newness of the service in the market; ISI= Incremental service innovation; TFIC= Technology-focused innovation capability; PQ= perceived quality, PV= perceived value; ST= satisfaction; *= significant value.*

As for the discriminant validity analysis (see Table 4), we see that in all cases the correlations between the factors are significant. As for the validity criteria, we see that the criterion of Fornell and Larcker (1981) is met, which indicates that the values of the AVE root located on the diagonal must be higher than the correlations of the factors, as well as the criterion of Kline (1998), which indicates that the correlations between factors must be lower than the value of .85, so we can ensure that there is adequate discriminant validity.

Table 4

Discriminant Validity Indicators

Variable	NSM	ISI	TFIC	PQ	PV	ST
NSM	**.87**					
ISI	.82*	**.93**				
TFIC	.79*	.82*	**.91**			
PQ	.64*	.74*	.68*	**.93**		
PV	.67*	.73*	.67*	.82*	**.84**	
ST	.56*	.67*	.55*	.78*	.73*	**.93**

*Note. On the diagonal root values of AVE; NMS= Newness of the service in the market; ISI= Incremental service innovation; TFIC= Technology-focused innovation capability; PQ= perceived quality, PV= perceived value; ST= satisfaction; *= significant value.*

Hypothesis

A model has been created consisting of 6 variables (see figure 1) which are NMS (F1), ISI (F2), TFIC (F3), perceived quality (F4), perceived value (F5) and satisfaction (F6). From the proposed relationships between these factors, the five hypotheses of the study emerge. In this sense, it is proposed that NMS (F1) ISI (F2) and TFIC (F3) predict the quality perceived by consumers (H1, H2, H3). On the other hand, we see that quality (F4) predicts perceived value (F5) (H4) and that this predicts satisfaction (F6) (H5). Below, we see the summary of the hypotheses that make up the study.

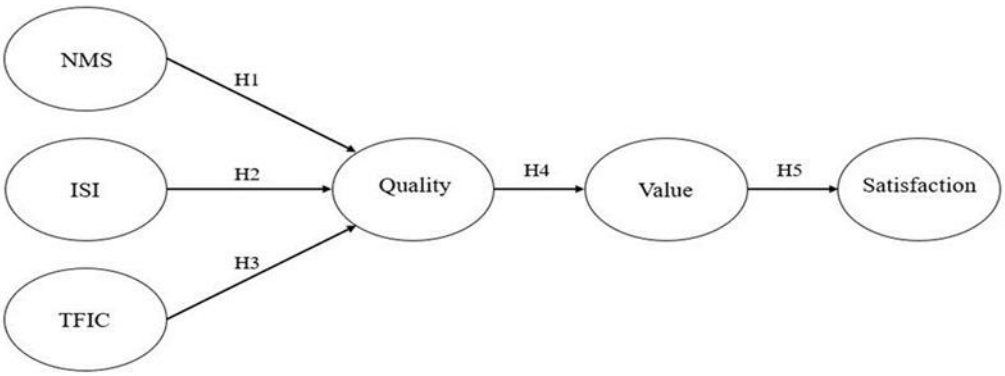

Figure 1. Hypothesis Model

Structural Model

Once the proposed structural model has been evaluated, we can confirm that the model is adequate both in the maximum likelihood case (x2/gl = 4.98, RMSEA = .08 (. 077-.088, NFI = .95, NNFI = .95, CFI = .96, IFI = .96) and in the robust case (x2/gl = 2.22, RMSEA = .05, .04-.052, NFI = .90, NNFI = .94, CFI = .94, IFI = .94). As can be seen, the ratio of chi-square and degrees of freedom is below 5 in the maximum likelihood case and below 3 in the robust case (Byrne, 2013). The fit indices exceed the criterion set at .90 (Hu & Bentler, 1999) and the RMSEA value falls below the cut-off value of .08 (Browne & Cudeck, 1993). Regarding the predictive capacity of the factors in the model, we see that NMS (β=-.16, T=.51) ISI (β=.65, T=8.20) and TFIC (β=.17, T=3.04) can explain up to 61% of quality, the relationship between NMS and perceived quality not being significant. On the other hand, quality (β=.91, T=24.22) can explain up to 83% of the value, and perceived value (β=.81, T=20.67) up to 66% of satisfaction.

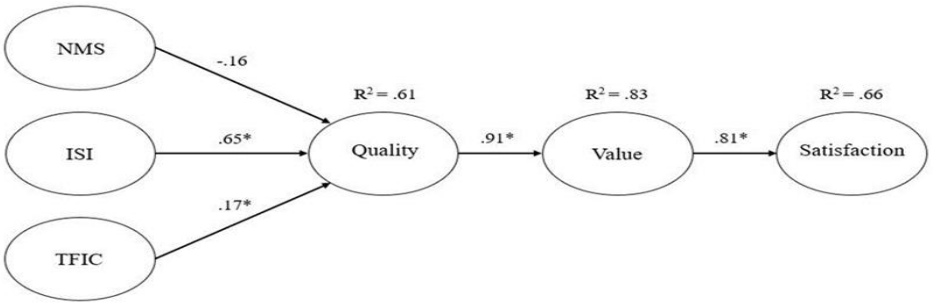

Figure 2. Structural Model Results

Finally, as a summary of the hypotheses proposed (see Table 5), NMS does not predict perceived quality, so H1 is not supported while ISI and TFIC do predict it, supporting H2 and H3. Subsequently, we see that quality predicts perceived value, supporting H4, and that this value predicts participant satisfaction, supporting H6.

Table 5

Summary of Hypotheses

Hypotheses	β	T	Result
H1. NMS→ PQ	-.16	.51	Non-Supported
H2. ISI → PQ	.65	8.20*	Supported
H3. TFIC→ PQ	.17	3.04*	Supported
H4. PQ→ PV	.91	24.22*	Supported
H5. PV → ST	.81	20.67*	Supported

Note. β= standardized beta value; T= T-statistic value; NMS= Newness of the service in the market; ISI= Incremental service innovation; TFIC= Technology-focused innovation capability; PQ= perceived quality, PV= perceived value; ST= satisfaction.

Discussion

The present study addresses a topic discussed in the scientific literature both in business and in the sports industry, to evaluate the ways in which service companies innovate (Ostrom *et al.*, 2010; Ratten, 2020). It has been evidenced that the notion of innovation, originating from concepts developed in manufacturing and high-tech industries, may not be fully applicable in service industries (Hipp & Grupp, 2005). For instance, it has been observed that in the service sector, greater attention is paid to non-technological innovation, which encompasses aspects such as improving management processes, implementing marketing strategies, offering customized solutions and optimizing the use of human capital (Djellal & Gallouj, 2001; Drejer, 2004; Wong & Singh, 2004).

This lack of attention to technological innovation is logically not advisable. Even less so today, where there has been a great technological advance that has also reached sports services and events, being a way to offer a better service and stand out from competitors. Aspects that were unknown not long ago, such as artificial intelligence, are beginning to be part of the context of sports management, so we must begin to consider it in relation to improving the innovation capabilities of the entities (Akter *et al.*, 2023). According to the results obtained, such technological innovation has a significant influence on perceived quality, which leads to a greater perception of value and greater satisfaction with the service. Therefore, we must pay attention to technology-focused innovation in order not to be isolated from the consumer with respect to the competition. It should also be noted that after the COVID-19 pandemic, forced by the restrictions it entailed, the technological evolution in all areas was particularly important. This meant that sports services and events had to implement technological improvements to be able to continue offering their product despite the restrictions. Therefore, this aspect has been improved in most sports services, also thanks to European funds aimed at promoting the digitization of services, such as the Next Generation programs. On the other hand, results have shown that Incremental Service Innovation is relevant to be able to improve perceived quality, although, as previously mentioned, it is a subjective aspect, so it will be the user's perception and their experiences that will define how innovative an initiative is (Raddats *et al.*, 2022). This incremental innovation tries to incorporate aspects to the

service (Myhren *et al.*, 2018). Although the literature indicates that larger companies benefit the most from this development of incremental innovation (Noone *et al.*, 2024), it is worthwhile for all companies, whatever their size, to consider it. In fact, being a less costly and risky initiative than radical innovation (Gui *et al.*, 2022), it is suitable for any company to try to implement such initiatives.

This can go along the lines of also improving technological aspects, as such incremental innovation can be achieved by adding technological aspects to the existing service (Ottenbacher & Harrington, 2010).

Finally, the newness of the service in the market has not been shown to be relevant in explaining perceived quality, so being new does not ensure improvements, consumers value other aspects such as those already mentioned to evaluate a service as being of higher quality. This coincides with other studies that indicate that newness in the market does not significantly influence performance (Lu *et al.*, 2021). Furthermore, studies such as Nyadzayo et al. (2023) confirm that this newness is not influential on perceived value and satisfaction, although it can potentially improve service customization and customer engagement (De Luca *et al.*, 2021). This could be due to the interaction of intermediate variables, that we should know in greater depth. Besides, it could also be due to consumer's lack of knowledge about the startup, which may make it perceived worse (Gimenez-Fernandez *et al.*, 2020).

In relation to this Steenkamp and Gielens (2003) indicate that the relationship between novelty and the probability of judgment is moderated by the degree of newness. Thus, the authors argue that at low levels of novelty, market success varies with newness in a U-shape, while at higher levels of novelty it varies with newness in an inverted U-shape. In this sense, it is understood that there is a level that could be optimal in terms of product newness, and that consumers will be more predisposed to products that have a moderate level of newness.

Therefore, this approach suggests that there is an optimal level of newness in the stimuli, so that consumers will prefer those products that offer a moderate level of newness rather than a zero or very high level of newness (inverted U-shaped relationship). In this sense, as indicated by van Trijp and van Kleef (2008), there is an optimal level of novelty preferred by consumers: high enough to generate curiosity and the desire to know more, but low enough to avoid generating fear. Along these lines, Meyers-Levy and Tybout (1989) established a theory that states that there is a positive effect in relation to the resolution of the incongruence generated by these processes based on the consumer's knowledge. These authors call it successful assimilation. Since at low levels of newness satisfactory resolution is not necessary, and at high levels it is unlikely to occur, the ideal is a moderate level where processing by the consumer is more positive.

Based on the above, the literature seems to suggest on the one hand that newness does not influence performance, but, on the other hand, that newness is a broader variable than it might seem, so it should be further analyzed and considered. There are studies that show that newness provides significant differentiation to consumers in the marketplace, which contributes to success (van Trijp & van Kleef, 2008). Other studies indicate that newness, interacting with adaptive marketing capabilities, promotes engagement, and that engagement can benefit performance (Lu *et al.*, 2021). When a company has well-developed adaptive marketing capabilities, its performance is better with strong Internet market newness than with weak market newness. Another explanation for this lack of significant relationship of market newness is the variety of aspects that can surround market newness. Not only a narrow view focused on technological aspects, but also aspects such as what is new, how new it is (the level at which newness constitutes an innovation) and for whom it is new (Johannessen *et al.*, 2001). Finally, the results show the significant relationship that exists between quality, value and satisfaction, which coincides with the literature where this relationship has been widely supported (Cuesta-Valino *et al.*, 2023; Gallarza *et al.*, 2013; Jeong & Kim, 2023).

Conclusions

The results confirm the importance of incremental service innovation and technology-focused innovativeness in explaining the perceived quality of the virtual sporting event participants. On the contrary, the simple fact that the service is new in the market does not influence this perception. Therefore, these results suggest that as managers we cannot rely on the fact that launching a new sporting event will automatically make it well perceived or modify users' perceptions. As the results indicate, novelty is not enough, so complementary aspects must be considered in order to modify participants' perceptions. On the other hand, it has been confirmed that this quality can explain the perceived value and consequently the satisfaction of virtual events participants. In view of these conclusions, given the importance of innovation in improving the perceived quality of service, it is clear that companies related to sporting events should promote innovation in their services. Especially, it would be important to improve those related to incremental innovation and innovation centred on technology, so that variables that are fundamental to the success and sustainability of the service, such as quality, perceived value and satisfaction, will benefit. The creation of virtual sporting events is an interesting innovative alternative, it can provide a wide variety of offerings and customization to reach an audience looking for different activities and even reach that audience that has not yet decided to participate in sporting events.

Implications, Limitations and Future Lines of Research

The results obtained in this study significantly support the calls of the existing literature and contribute to the enrichment of our understanding of the concept of service innovation. In addition, this study has scientific implications, as it contributes to increase the literature on virtual sporting events and lay the foundations for their study. This field is unexplored, so this research is a contribution to provide this sector with more contrasted information. On the other hand, the study has implications for management. On the one hand, it makes it possible to understand the importance of innovation for the improvement of variables that are key to business success. On the other hand, it allows us to understand how these variables work in the specific field of virtual

sporting events. Therefore, this helps managers of this type of events to make better decisions and try to improve their results through innovation. In a more concrete way, it is evident that incremental service innovation (ISI) and technology-focused innovation capability (TFIC) are critical dimensions that must be prioritized in service management to achieve an optimal level of quality in service delivery. These findings highlight the importance of recognizing that, today, continuous service improvement and the ability to implement technological innovations are critical factors in maintaining competitiveness and customer satisfaction in an ever-changing business environment. Therefore, it is essential that sports organizations pay special attention to these dimensions and seek effective strategies to foster innovation and improve the quality of their services. A concrete example would be the improvement and expansion of the services offered (the promotion of virtual running), and the acquisition of innovative software on the market (specialized software for virtual running).

In terms of limitations, first we can comment on the fact that only one virtual sporting event has been analyzed. Therefore, although the results are interesting, they cannot be clearly generalized to all types of events, although they do allow us to establish certain guidelines. Therefore, it would be interesting in future lines of research to look at other types of virtual events, to contrast whether the proposed relationships are strengthened. On the other hand, it would be interesting to analyze other variables that may have to do not only with innovation but also with technological aspects and user experience in the virtual sporting event. Finally, regarding the conceptual aspects of the novelty of the service in the market, as indicated above, novelty can have different visions. Therefore, it would be interesting to try to address these different points of view on novelty in the market so as not to have too narrow a vision that misses information along the way. In summary, for future research, it would be beneficial to expand the sample, to do it to other virtual sporting events internationally, and to explore a broader set of study dimensions that can significantly enrich the understanding of the innovation construct.

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Authors' Biographies

Daniel Martínez-Cevallos is a Professor at the Central University of Ecuador, PhD in Sports Management (University of Valencia, Spain). Specializing in Marketing and Sports Management. Member of the Sports Management and Innovation Research Group (SMIrg) of the University of Valencia. His research is focused on areas of sport management and marketing, especially in the brand and quality perception and user satisfaction in sport-related services and events organizations.

Mario Alguacil Jiménez is an Assistant Professor at the Faculty of Sport Sciences at the University of Valencia. He holds a PhD in sports management (University of Valencia) and a PhD in marketing (University Jaime I). His research interests are consumer behavior in the sports context, brand management, and the analysis of the relationship between brand perception and the results of sports-related entities. He is associate editor of the sports management area of the Spanish Journal of Physical Education and Sports, a journal created by the COLEF, which is the Council aimed at representing professionals in the field of sports in Spain.

Carlos Pérez Campos, PhD in sports management, is a full-time professor at the Catholic University of Valencia. His main research areas are the analysis of the quality of service in relation to sporting events as well as the perceived quality and satisfaction of spectators and athletes who participate in sporting events.

Ferran Calabuig PhD in sport management, is an associate professor at the University of Valencia and leads the Sport Management & Innovation Research Group. His main lines of research are related to sport consumer behaviour, sport marketing, sport sponsorship, sport entrepreneurship, and sport tourism. He publishes regularly in prestigious international journals such as Journal of Business Research, Technological Forecasting and Social Change, Industrial Management and Data Systems, International Journal of Sports Marketing and Sponsorship, International Entrepreneurship and Management Journal, among others.

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