

Article

The Influencing Factors of Users' Attitudes and Continuance Intention for Olympic Viewing on Mobile Applications in China

Zhiyuan Yu  and Yuke Huang *

School of Journalism and Communication, Shandong University, Jinan 250100, China

* Correspondence: huangyuke@mail.sdu.edu.cn

Abstract: Along with the proliferation of the mobile information system, broadcasters depend on multiple channels to distribute the massive amount of Olympic content. Users' viewing habits for the Olympics gradually tend to be diverse, and undergo changes from the outlets of television to mobile broadcasting on smartphones. Through the mobile application of rights holding broadcasters, the users not only watch high-quality live-streaming content via multiple platforms but also enjoy interviews with athletes after the competition. In this way, it is necessary to investigate the users' potential attitudes and intentions toward mobile viewing regarding the emerging techniques. In this study, we conduct an online survey to reveal the influencing factors of users' attitudes and continuance intention of Olympic viewing on a mobile app during the period of Tokyo 2020 Summer and Beijing 2022 Winter Olympics, where a total of 439 valid responses are collected. A conceptual model integrating the technology acceptance model and information system success model is established, which consists of information quality (IQ), system quality (SYQ), subjective norms (SN), innovativeness (INN), perceived ease of use (PEOU), perceived enjoyment (PE), attitude (ATT), and continuance intention (CI). For the measurement, partial least square structural equation modeling is adopted to test the proposed model. The results show that respondents hold positive attitudes and robust continuous intentions towards mobile viewing. We also find that the constructs of IQ, SYQ, SN, INN, PEOU, and PE have a direct impact on attitude and continuance intention, which explained 80.6% and 70.8% of the variance, respectively. Although PEOU, PE, and SN are unexpected to have no direct correlation with CI, all of them can indirectly impact CI via the mediation of ATT. Therein, the moderation effects of average time focusing on Olympic contents and app usage time per session exists between PEOU and CI and SN and CI, accordingly. Through empirical investigation, this study offers a glimpse into individuals' perception and willingness to mobile Olympic viewing, which aims to provide a reference for relevant Olympic service providers.



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Keywords: mobile viewing; mobile application; olympic games; technology acceptance; information system success; users' attitudes; continuance intention

1. Introduction

With the explosive development of mobile technology and empowered by the “mobile-first” strategy [1], the mobile system is regarded as the prominent constitute among information systems and, meanwhile, mobile devices become a ubiquitous part of everyone's life. Particularly, supported by the influx of mobile application users, the worldwide usage of mobile Internet has surpassed that of traditional Internet via desktop in terms of data traffic since 2016 [2]. For example, a total of 3.8 trillion hours on mobile apps were consumed in 2021 [3]. Especially, users from 13 regions (e.g., Singapore, Brazil, Australia, India, Japan, Canada, Russia, the US, the UK.) spend more than four hours on mobile apps per day, which commands over 30% of their waking hours [4].

Compared with TV and desktop outlets, the mobile information system caters to users' appetite for mobile viewing through the advantages of convenience, interactivity,

and intelligence, which leads to the bulk of time committed to video and live stream applications. Globally, there are an estimated 2.99 billion mobile phone video viewers in 2022 [5], with mobile streaming taking up an average session length of 90 minutes for Gen Z [6]. In China, it is estimated that up to 879.5 million viewers watch videos by mobile phone in 2022, commanding 87.6% share of the Internet users [7].

The Olympic Game is regarded as a big festival for people who are fascinated by sports around the world. Consistent with the evolution of media consumption, the manners for Olympic viewing witness synchronous changes. The users have more flexible media channels and enjoy unprecedentedly diversified ways to watch the Olympics. For instance, television, Internet streaming, social media, mobile application, and even multi-screen viewing are all available choices. According to International Olympic Committee (IOC) statistics, among the global broadcast audiences, the number of television viewers watching the Beijing 2008 and Tokyo 2020 Olympic Games reached 3.5 billion and 3.05 billion, respectively [8]. Whilst the Tokyo 2020 Olympic Games is viewed as the “first streamed Games” [9], which has 2.24 billion digital unique users and 14.3 billion digital video views. Compared with Beijing 2008 Olympic Games [8], there was a sharp rise of 460% in digital unique viewers and a staggering 1943% upsurge in digital video views. For the Winter Olympic Games, the amount of digital users increased from 130 million in Vancouver 2010 to 670 million in PyeongChang 2018 [8]. As for the 2022 Beijing Winter Games, more than 2 billion people followed it on social media worldwide [10]. Within the host country, China provided 1410 hours of streamed and mobile coverage, accompanied by novel applications such as 5G+4K, 8K+AI, and virtual reality (VR) via participating rights holding broadcasters (RHBs) [11]. In general, we can see that mobile viewing on digital media platforms (or applications) becomes a vital supplement channel in addition to traditional television, which seems to reach its saturation point.

However, few studies have specifically concentrated on mobile viewing of the Olympics through digital platforms (e.g., mobile applications). As the RHB in China, the China Media Group (CMG) Mobile App is a representative product to watch the Olympic Games. Considering its powerful comprehensive strength and stunning Olympic marketing performance, we take the CMG Mobile App as the target digital platform and then aim to explore the users’ attitudes and continuance intention for mobile Olympic viewing by addressing the following research questions (RQs):

- RQ1: What are users’ attitudes and continuance intention to watch the Olympic Games by the way of mobile viewing on the CMG App?
- RQ2: What’s the relationship between users’ attitudes and continuance intention to watch Olympic Games by the way of mobile viewing on the CMG App?
- RQ3: How do the influencing factors impact users’ attitudes and continuance intention to watch the Olympic Games by the way of mobile viewing on the CMG App?

The rest of the paper proceeds as follows: Section 2 illustrates the theoretical background of technology acceptance and the information system success model. The literature related to Olympic viewing and the CMG Mobile App is also introduced. Section 3 proposes the conceptual model and the associated hypotheses. Section 4 describes data collection and the demographic information of respondents. Section 5 elaborates on the results of data analysis, including reliability and validity, hypothesis testing, and multi-group analysis. Section 6 discusses the main findings and interpretation. Section 7 concludes the paper and indicates the implication of the study. Moreover, the limitations are also presented.

2. Literature Review

2.1. Theoretical Background

As technology becomes an indispensable part of daily life, there emerges some theories attempting to understand and predict an individual’s adoption of new technology, such as the theory of reasoned action, technology acceptance model (TAM), TAM2, unified theory of acceptance and use of technology (UTAUT), etc.

TAM is regarded as the most influential and universally employed theory, which can measure and predict an individual's intention and acceptance behavior. For information systems (IS), TAM quickly took hold and was applied in the studies of online education [12], financial services [13], Internet technology [14], hedonic systems [15], etc. Initially, two antecedents, perceived usefulness (PU) and perceived ease of use (PEOU), were proposed to evaluate attitude. The behavioral intention (BI) is affected by a combination of PU and attitude, which further influences BI on actual use [16]. Subsequent studies integrated additional constructs to upgrade TAM. For example, the enjoyment was incorporated as a key addition for usage intention (UI) of computers in workplace [17]. The findings showed that both PU and enjoyment had positive associations with UI, whereas enjoyment was relatively weak but still robust. What is more, both of them served as strong mediators of PEOU on UI [17]. The modification added enjoyment to redevelop TAM, but was still under the context of utilitarian systems. An empirical study using co-citation analysis verified that hedonic systems could be a future trajectory of TAM, where perceived enjoyment and PEOU would have more powerful influences than PU when explaining positive attitude towards IS [18]. With other basic components in TAM, TAM2 excludes attitude and remains subjective norms (SN) from theory of reasoned action, which combines the factors such as image, job relevance, output quality, result demonstrability, and the moderating variables (i.e., experience and voluntariness). Therein, SN has a positive interaction with UI in mandatory settings, indicating the significant role of social influence [19].

Integrating prior theoretical models, UTAUT is formulated with the core constructs of performance expectancy, effort expectancy, social influences, and facilitating conditions. Four moderators (i.e., age, gender, experience, voluntariness) are also added in the UTAUT model to predict BI and actual use behavior in organizational contexts [20]. Therein, the impact of effort expectancy on BI can be moderated by age, gender, and experience, while the effect of social influence on BI was moderated by age, gender, voluntariness, and experience as well. Combined with the additional constructs of hedonic motivation, price value, and habit, the UTAUT2 model is proposed for the consumers' technology usage [21], which can improve the explained variance in behavioral intention.

Parallel to the stream of TAM, the information system success (ISS) model is developed and consists of system quality, information quality, use, user satisfaction, individual impact, and organizational impact [22]. Seddon amended the model with two variance sub-models (i.e., IS use and success) and incorporated the additional element of PU, which acted as a proxy for net benefits [23]. Pitt et al. incorporated service quality as a separate construct, which was an instrument when measuring IS effectiveness [24]. Afterward, DeLone and McLean introduced service quality as a key component of the IS aspect and replaced individual and organizational impact with net benefits. Moreover, intention to use was also added considering the complexity of IS [25]. Therein, increasing user satisfaction could result in a higher level of intention to use and ultimately influence actual use [26]. Liou et al. employed adapted information quality and system quality as antecedents to assess users' attitudes in the context of IPTV [27]. Generally, the ISS model is recognized as an effective framework in comprehending and describing the multidimensional aspects of IS, and has been widely utilized in various areas such as knowledge management [28], e-commerce [29], e-learning [30], mobile applications [31], etc., to predict the success of IS.

2.2. Olympic Viewing

There are some related studies of the Olympic Games in the domains of media coverage [32], advertising strategies [33], etc., from the communicators' perspective. The curiosity of this study lies in audiences' watching behavior of the Olympics. Initially, research is derived from the consumption of television. Rothenbuhler suggested that the behavior of watching the Olympics around the TV could be likened to a religious experience [34]. To elaborate, the viewers tended to be more talkative and social-integrated while enjoying the spectacle and excitement of the Games. Chalip et al. articulated that the polysemic narratives of multiple storylines, embedded genres (e.g., festival, spectacle,

ritual), and layered symbols (e.g., banners, flags) of the Olympics could enhance audience commitment to sporting events [35]. Mcdaniel et al. confirmed the negative influences of commercialism and nationalism on spectators' enjoyment of NBC telecast [36]. Hede identified the positive correlation between audience usage of Australian telecasts and the perception to travel to Greece for the Athens 2004 Olympic Games [37]. Majid et al. investigated the growing interest in Winter Games specifically, and concluded that themes of brand, experiential aspects, myths, and heroes served as the motivators [38]. Putting an eye on elements such as myths, spectacle, ritual, and symbol in the period, scholars scrutinized the Olympic viewing behavior through the lens of semiology meticulously, as well as the role of commercial elements in the mega-event.

With the advent of the Internet, the 2008 Beijing Olympic Games was reckoned as the "first online Olympics" [39]. Accordingly, research in this period witnessed a shift from television only to an ever-enlarging expansion of the digital world. Tang et al. explored the audience's experience, particularly the gendered issue when predicting the usage of TV and web [40]. Similarly, another study concentrated on the spectatorship of multi-screen content and revealed the role of sports fandom [41]. The authors of [39] reported that web users were more motivated to watch Olympics than non-users.

Empowered by the mobile Internet, the London 2012 Olympic Games was considered the "first mobile Olympics" [42]. Extant literature on the fusion tells a systemic story of the predictors for fragmented media consumption. Tang et al. pointed out that viewers' exposure to mobile content for the London Games was determined by variables such as motivations, preference, perceived usefulness, access to media technologies, and media use routine [42]. For the usage of social media, the factors of demographics, personality, motivations, preference, media use routine, and viewing context could explain users' engagement for the Rio Olympics [43]. Billings et al. studied 16 use and gratification factors (e.g., arousal, passing time, entertainment, seeking information, etc.), and found that the variables bifurcated by different media platforms (TV, computers, tablets, smartphones) and nations [44]. Devlin et al. delineated differences of national identification and sports fandom across six countries for the usage of TV, computer, and mobile devices [45]. To sum up, individual factors incorporating social cognitive factors (e.g., motivations, preference, demographics), use and gratification factors, nationalism and fandom, and structural factors such as access, media use routine, etc., are the predominant predictors of multi-screen viewing behavior. Additionally, researchers also tried to determine the influences of such behavior. Billings et al. found that multimedia usage had a prolonged impact on the public's national identity manifested as higher scores of indicators including patriotism, nationalism, and smugness [46]. The later study reaffirmed their findings across various platforms, but suggested an additional indicator of internationalism [47]. Lankinen examined a mobile app called Sotshi Areena in Finland by employing a case study, and reported that consumption of the mobile service resulted in more satisfied and engaged experiences of the overall Olympic production [48].

Speaking of the coexistence of multiple media channels for Olympic viewing, comparative studies had been conducted. Kim et al. compared the patterns of television, personal computer, and mobile devices in fulfilling audience's gratification of Olympic media consumption, and concluded that television was still the dominant outlet in Korea during 2014 Sochi Winter Olympic Game [49]. Hutchins et al. found that the social media and multi-screen viewing gradually became popular and extend the coverage of television during Rio 2016 Games for Australia and United States audiences [50]. After all, the existing multiple media technologies for Olympic viewing is not a zero-sum game. Whilst television still serves as the primary means, other medium extend and complement the televisual media logic for mega sports coverage.

2.3. CMG Mobile App

Embracing the prosperity of mobile applications and the trend of media convergence, the China Media Group (CMG), the country's authority broadcaster, rolled out a com-

prehensive audio-visual platform—the CMG Mobile App on November 2019. Initially relying on the vast resources of the CMG, the application rapidly grasps the market with abundant rights to mega sports events and enormous related content. As China’s major rights-holding broadcaster (RHB) of the Olympic Games, the service featured loads of live broadcasts of the Olympic events in the world-leading 4K/8K ultra-high-definition (UHD) during the Tokyo and Beijing Games. When watching the Games, users of the CMG Mobile App could experience a range of cutting-edge technologies such as VR panoramic video, AI intelligent anchor, multi-path streaming, etc, as well as a “C-user circle” to produce their own content and share their feelings with one another. Currently, the CMG Mobile App is a comprehensive video app characterized by live streaming, socialization, and emerging technologies for sports viewing. The main services and functions of the CMG Mobile App for Olympic viewing are summarized as follows:

- Personalized recommendation mechanism: the CMG Mobile App provides a series of personalized services incorporating favorite, playback, search, subscription, recommendation, and an exclusive electronic program guide (EPG) that includes features of schedule reminder, on-demand videos, and additional relevant event information.
- Diverse and high-quality live streaming: C-users can enjoy prompt Olympic live streaming in 4K UHD and can project it on TV. They can also choose multi-path, VR, and slow live streaming (raw live broadcast without any signs of production), and meanwhile express their feelings and ideas in the comment area of the live streaming.
- Interest-oriented social circles: a major feature of the CMG Mobile App is the C-user circle. Users can join, post, and comment in different communities that are organized around their interest in the C-user circle.
- Humanistic and customized game-viewing service: an AI sign language anchor specifically designed for hearing-impaired people was launched during the Beijing Winter Olympics. Another attempt lies on the digital snowflake, which is based on technologies of AI image recognition, cloud rendering, blockchain, etc., to create exclusive and permanently reserved snowflake and digital certificate for every user.
- Membership profit mode: the CMG Mobile App generates revenue from membership subscriptions. Users who pay for the membership can enjoy Olympic live streaming with no advertisements and no delay as well as other members-only resources.

As of June 2022, the CMG Mobile App has already accumulated 410 million downloads and 140 million activated users since its foundation in 2019 [51]. During the Tokyo Games, the CMG Mobile App provided more than 7000 live matches and 3500 hours of live streaming, with video views exceeding 2.58 billion in total and the membership breaking 1 million within a week [52,53]. For the Beijing Winter Games, the CMG Mobile App offered more than 550 hours of live streaming and benefited more than 2.16 million people with the AI translator, whilst the total video view has surpassed 800 million and over 20 million users gained their digital snowflakes [54]. Additionally, the CMG Mobile App has topped Apple’s app store during both Olympics [52,54], which is a typical example of mobile Olympic viewing acceptance research.

3. Research Model and Hypothesis

Theoretically based on the ISS and TAM, this study aims to figure out users’ attitudes and continuance intention and the influencing factors of mobile Olympic viewing on the CMG Mobile App. The proposed conceptual model integrates constructs of information quality (IQ), system quality (SYQ), perceived ease of use (PEOU), perceived enjoyment (PE), subjective norms (SN), innovativeness (INN), attitude (ATT), and continuance intention (CI), which are defined in Table 1.

Table 1. Definitions of the constructs.

Construct	Definition	Reference
CI	The extent of users' intention to continue using the CMG Mobile App.	Amoroso et al. [55]
ATT	The degree to which users have a favorable or unfavorable evaluation or appraisal of watching Olympics on the CMG Mobile App.	Ajzen [56]
PEOU	The extent to which users believe that it is easy to use the CMG Mobile App to watch Olympics.	Davis [16]
PE	The degree to which users perceive the process of using the CMG Mobile App to watch Olympic as enjoyable.	Venkatesh [57]
IQ	The quality of the Olympic content and information provided by the CMG Mobile App.	Abbasi et al. [29]
SYQ	The extent to which the CMG Mobile App is technically sound during the Olympics.	Gorla et al. [58]
SN	The degree to which users believe that important others think they should use the CMG Mobile App to watch the Olympics.	Wu et al. [59] Jeng et al. [60]
INN	Users' willingness to adopt innovative technologies or services on the CMG Mobile App to watch the Olympics.	Matute et al. [61]

3.1. Continuance Intention and Attitude

Continuance intention illustrates a mental state reflecting an individual's decision to continue using a particular information system [62,63]. Different from initial use or acceptance, it further sheds light on the later phases of the adoption process, namely, it investigates the usage life cycle in a longitudinal way [63].

In the existing research, the continuance intention of social information systems and mobile information systems has drawn increasing attention, revealing a tendency in recent years [64]. With an intention of entertainment and collaboration in IS, PEOU, PE, attitude, and SN are proved to be salient predictors for continuance intention [65]. We therefore consider it as our outcome variable.

Attitude can be viewed as the extent to which an individual is favorably or unfavorably inclined towards an object [66]. As Davis et al. ascertained the decisive role of attitude in explaining technology's initial adoption in TAM [16], considerable research has also advocated its causal relationship with continuance intention [67]. Wu et al. found that behavioral attitude could positively predict continual usage intention pertaining to E-Learning 2.0 [59]. Amoroso et al. asserted that attitude was the strongest determinant of continuous intention, whereas satisfaction was only weakly correlated with continuance intention and was mediated by habit [55]. Wu et al. indicated that positive attitudes regarding MOOCs enabled users to be more willing to continue using it [68]. Accordingly, we hypothesize:

Hypothesis 1 (H1). *Attitude positively influences users' CI towards the CMG Mobile App.*

3.2. Perceived Ease of Use and Perceived Enjoyment

As a key variable in TAM, PEOU is a reliable factor in influencing individual's new technology adoption behavior. If an information system is comparatively easy to operate, people are more likely to explore its services and continuously use it. Perceived enjoyment (PE) is the perception of pleasure and enjoyment when using a specific system, which emphasizes the intrinsic experience and self-fulfillment generated from the process rather than the performance consequence resulting from the system use [57]. Since Davis et al. [17] added perceived enjoyment to further develop TAM, it has been attested as a robust indicator of individuals' technology acceptance decision especially in the field of hedonic

environment [49]. To be specific, as enjoyment is one of the main reason people opt to use an application, users who perceive gratification and joy from the process of using mobile app are more motivated to accept the innovative contents and adopt them more extensively [69].

Currently, numerous studies have revealed the importance of PEOU and PE in explaining people's attitudes and continuing usage towards different information systems. For example, Lin et al. pointed out that PEOU had critical positive impacts on both attitude and CI for less experienced users regarding e-learning [70]. For AR entertainment applications, Hung et al. suggested that PE could positively influence users' intention to reuse the technology via the mediating role of attitude [71]. In the case of mobile gaming, Chinomona examined the impacts of PE and PEOU on attitude and CI and reported that all the posited assumptions were empirically supported [72]. Moreover, the causal relationship between PE and PEOU has also been widely researched. Nevertheless, the findings were shown to be inconsistent. In brief, PEOU has been conceptualized as either a motivator [17] or consequence [73] of PE. In light of this alarming phenomenon, Sun et al. addressed the inconsistency by employing Cohen's path analysis and concluded that PE tended to be more predictive of PEOU for utilitarian systems, while the causal direction might be reversed in hedonic systems [74]. We hypothesize as follows:

Hypothesis 2 (H2a). *PEOU positively influences users' attitudes towards the CMG Mobile App.*

Hypothesis 2 (H2b). *PEOU positively influences users' CI towards the CMG Mobile App.*

Hypothesis 2 (H2c). *Users' PEOU of the CMG Mobile App positively influences PE.*

Hypothesis 3 (H3a). *PE positively influences users' attitudes towards the CMG Mobile App.*

Hypothesis 3 (H3b). *PE positively influences users' CI towards the the CMG Mobile App.*

3.3. Information Quality and System Quality

The qualities of information and system are both essential components of the ISS model. When combined together, they can comprehensively assess the attributes of an information system and thus predict the success of IS.

Information quality can be defined as the quality and characteristics of the output provided by an information system [26], which measures multifaceted dimensions such as timeliness, reliability, completeness, relevance, readability, etc. [22]. With users having limited time and energy to figure out the complex ingredients that enable the system, the credible, up-to-date, abundant and relevant Olympic content presented by the CMG Mobile App serves as the visible source of positive consumption experiences, sometimes even a state of "binge-watching" [29].

System quality denotes the quality of information system processing itself, including both software and data components, which is featured by the application of cutting-edge technologies and a system delivering desirable functions and features [58]. Drawing from prior research [25,58,75,76], we elicited interface design, reliability, ease of use, response time, interactivity, functionality, and personalization as indicators for the CMG Mobile App. After all, a well-navigated, constructed, implemented system is a necessary prerequisite for the success of an information system.

The quality items mentioned above have been consistently studied in the field of IS. Cheng investigated nurses' usage intention of e-learning systems and stated that IQ and SYQ both have direct positive influences on PEOU [77]. Zhou [78] also indicated that the quality items could positively impact users' PEOU in the context of mobile websites. Meanwhile, the quality items also positively affect attitude. Liou et al. investigated users' continuance intention to use broadband television, the results showed that perceived system quality and perceived content quality, which were similar to SYQ and IQ, had significant and positive effects on users' attitudes [27]. Park et al. empirically validated

that SYQ had notable impacts on attitude in the area of mobile cloud services [79]. So the hypotheses are presented as follows:

Hypothesis 4 (H4a). *IQ positively influences users' PEOU of the CMG Mobile App.*

Hypothesis 4 (H4b). *IQ positively influences users' attitudes towards the CMG Mobile App.*

Hypothesis 5 (H5a). *SYQ positively influences users' PEOU of the CMG Mobile App.*

Hypothesis 5 (H5b). *SYQ positively influences users' attitudes towards the CMG Mobile App.*

3.4. Subjective Norms

Derived from the theory of reasoned action, subjective norms imply that an individual's behavior can be shaped by the perceptions and wishes of referent others, including friends, leadership and groups, etc. [80]. It comprises both interpersonal influences (e.g., family members, colleagues) and external influences (e.g., expert ideas, media coverage) [62]. The mechanism of such influences relies on the synchronization with others' opinions and adoption intentions [81]. In other words, people are inclined to perform a certain action to obtain acceptance within their circles [82]. Previous studies have manifested that subjective norms were more salient under the context of collectivistic culture [83]. As Olympic viewing is a social-interacted and group-affiliated behavior, we therefore add it to our model to provide a broader view for this study.

The influencing role of subjective norms in attitude and continuance intention has been elaborated [71]. Xu et al. found that attitude acted as an intervening variable between SN and CI [80]. Ashrafi et al. elucidated that subjective norms contributed to an individual's continued usage intention and created long-term users of a learning management system [84]. Yang et al. explored individuals' usage of mobile taxi booking applications and concluded that SN was an effective factor that positively affected users' behavioral attitudes, while the influence of SN on CI was insignificant [85]. For the adoption of virtual reality leisure activities, Jeng et al. claimed that subjective norms were the strongest indicator of CI, whereas attitude was relatively weaker but still reliable [60]. Therefore, we hypothesize:

Hypothesis 6 (H6a). *SN positively influences users' attitude towards the CMG Mobile App.*

Hypothesis 6 (H6b). *SN positively influences users' CI towards the CMG Mobile App.*

3.5. Innovativeness

Innovativeness conveys the propensity to adopt innovative technology-based products or services [86], which reflects an individual's personality traits. As a core view of the diffusion of innovation theory, innovativeness is a crucial predictor of new technology acceptance behavior, for people with a higher level of innovativeness are expected to have a higher willingness to adopt the innovation than others [87].

Innovativeness has been demonstrated to play a vital role in predicting users' attitudes as well as continuance intention [88]. Li et al. found that consumer innovativeness could impact the purchase intention for sustainable products both directly and indirectly through the mediating effect of attitude [87]. Lu pointed out that innovativeness had a direct positive effect on user retention and continued usage of mobile commerce [89]. Additionally, innovativeness also positively affects PEOU [90]. Thus, we hypothesize:

Hypothesis 7 (H7a). *Innovativeness positively influences users' attitude towards the CMG Mobile App.*

Hypothesis 7 (H7b). *Innovativeness positively influences users' CI towards the CMG Mobile App.*

Hypothesis 7 (H7c). *Innovativeness positively influences users PEOU of the CMG Mobile App.*

In conclusion, the proposed model and assumptions are summarized in Figure 1.

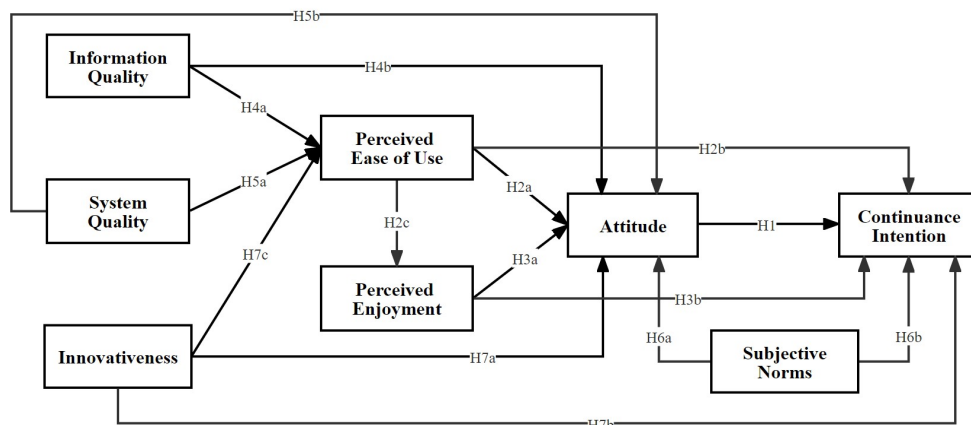


Figure 1. The proposed conceptual model.

4. Research Method

4.1. Data Collection

In order to examine users' mobile streaming consumption behavior for the Olympic Games, we conducted an online survey from 30 June to 29 July, 2022. People who used the CMG Mobile App (authorized broadcaster for Olympics in China) to watch the Tokyo 2020 Summer or Beijing 2022 Winter Olympic Games were invited to fill out the questionnaire. The distribution channels included: (1) social media circles and chatting groups (e.g., WeChat and QQ); (2) survey platforms (WJX and Credamo). The snowball sampling method was also used to collect data. The qualification questions (i.e., respondents who watch the Tokyo or Beijing Olympic Games via the CMG Mobile App) were presented at the beginning of questionnaire to screen the target participants. In addition, we designed an extra recruitment questionnaire to investigate the media preferences of the Olympic viewers on Credamo platform. Only respondents who chose the CMG Mobile App as their preference channel would be invited to complete the whole questionnaire. During the research process, the participants' personal privacy and collected data were firmly protected.

To control the quality of the collected samples, the following screening criteria were adopted: (1) pass the screening questions; (2) the filling time should be within 120 s to 1200 s; (3) all items in the scale should not be exactly the same. As a result, out of 589 questionnaires returned, a total of 439 valid questionnaires were remained. The recovery rate was 74.53%. The samples size was both greater than ten times the largest measurement block and the largest structural equation, which was sufficient for stable estimates [91]. To measure items presented in Table A1 (Part I) and Table A2 (Part II) of Appendix A, a seven-point Likert scale (1 = "strongly disagree", 7 = "strongly agree") was employed. After the pre-test, we removed some items (labeled with *) considering their outer loadings were below the critical value of 0.7. Items labeled with ϕ were also canceled for discriminant validity according to the Fornell–Larcker criterion.

4.2. Descriptive Analysis

The demographic information of valid responses are summarized in Table 2. For gender profile, there are 137 males and 302 females. In terms of age distribution, the majority of the surveyed people are young adults. To be precise, 60.1% of them are aged between 18 and 25, and 13.0% of them are 26–30 years old. Notably, there still exists 6 older users (over 60 years old) and 10 juvenile users (under 18 years old), which reveals the reality that all age groups gravitate to mobile Olympic viewing. As for education degree, most of the participants are well-educated, with 73.8% having undergraduate degrees and 11.2% postgraduate and above. For the regional distribution, respondents from Europe and 30 of China's 34 regions participated in the survey. Therein, participants from Chongqing

(28.9%), Shandong (15.5%), and Beijing (5.7%) rank as the top three places. Of the three major economic zones in China, 44.6% of the respondents are from the eastern coastal areas (such as Shandong, Beijing, Guangdong, Jiangsu, Shanghai, etc.), 17.3% are from middle areas (such as Jiangxi, Anhui, Henan, Hebei, etc.), and 37.4% are from western areas (such as Chongqing, Sichuan, Guizhou, Shaanxi, etc.). Additionally, there are 2 participants from Macau and 1 from Europe.

Regarding Olympic viewing behavior, the mobile phone is the most popular device, with 87.5% of respondents regarding it as their preferred device. Television is still noticeable, which accounts for 72% of the respondents' usually used device. A considerable number of participants (48.7%) chose a tablet to watch the Games, whereas the computer is the least used device (41.7%). As for media channels, two sequencing questions were used to investigate respondents' preferences. When watching Olympic events, 56.3% of the surveyed people polled television programs as their first choice, meanwhile 35.3% and 8.4% of them considered mobile applications and streaming websites as their first choice, respectively. When accessing Olympic information, social media platforms is the most welcomed media outlet, with 43.5% of respondents ranking them first, which is followed by TV and news applications with 36.7% and 6.8%, accordingly. Speaking of the degree of interest of the Olympic Games, most of the viewers (77.7%) focus only on the important matches and the key figures' games, still 22.8% of them show a great interest in the Games. Moreover, the investigation results show that 35.5% of valid participants spend a daily average session of 30 mins to 1 h on Olympic related content during the Games' period, all while 28.7% and 15.3% of them spend 1–2 h and 2–4 h, respectively. The cumulative percentage of respondents who spend an average length of 30 mins–4 h focusing on Olympic content is 79.5%, which reflects people's enthusiasm for the Games.

For the aspect of app usage behavior, 48.5% of participants used the CMG Mobile App for more than 1 year, which is relatively long due to the fact that the app first launched on 20 November 2019. It is also worth noticing that the fresh users (1–6 months) account for a fair 31.4%, which is possibly attributed to the influence of the 2022 Beijing Olympics. In terms of usage frequency, most respondents use it when needed, with a precise 65.4% percentage. For a single session, 36.2% of the surveyed people use it for 10–30 mins, while 57.2% of them use it for 30 mins to 2 h. About the app's membership, 19.8% of respondents used to buy it. For the services and features of the mobile app, playback (77.7%), search (68.1%), and comment (40.1%) are the most well-experienced, whereas innovative functions such as 4K high definition video (32.3%), multi-path streaming (18.0%), and VR panoramic video (11.8%) are also explored by users.

Table 2. The demographic characteristics (N = 439).

Characteristic	Category	Frequency	Percentage
Gender	Male	137	31.2%
	Female	302	68.8%
Age	Under 18 years old	10	2.3%
	18–25 years old	264	60.1%
	26–30 years old	57	13.0%
	31–40 years old	27	6.2%
	41–50 years old	53	12.1%
	51–60 years old	22	5.0%
	Over 60 years old	6	1.4%

Table 2. Cont.

Characteristic	Category	Frequency	Percentage
Education	Junior high school	3	0.7%
	High school	22	5.0%
	College	41	9.3%
	Undergraduate	324	73.8%
	Master's and above	49	11.2%
Preferred Olympic Viewing Device (multiple choice)	Television	316	72.0%
	Mobile phone	384	87.5%
	Tablet	214	48.7%
	Computer	183	41.7%
Level of Interest in the Games	Focus only on the big games	341	77.7%
	Conversely	98	22.3%
Average Time Focusing on Olympic Content (per day)	0-30 mins	67	15.3%
	30 mins–1 h	156	35.5%
	1–2 h	126	28.7%
	2–4 h	67	15.3%
	4–6 h	16	3.6%
	Over 6 h	7	1.6%
App Usage Time From the First Download	1-3 months	73	16.6%
	3–6 months	65	14.8%
	6–9 months	42	9.6%
	9–12 months	46	10.5%
	1–2 years	119	27.1%
	Above 2 years	94	21.4%
App Usage Frequency	1–3 times a week	82	18.7%
	4–6 times a week	44	10.0%
	Everyday	26	5.9%
	Not sure, use when needed	287	65.4%
App Usage Time per session	0-10 mins	17	3.9%
	10–30 min	159	36.2%
	30–60 min	169	38.5%
	1–2 h	82	18.7%
	Above 2 h	12	2.7%
App Membership	Previously purchased	87	19.8%
	Never	352	80.2%

5. Data Analysis

In this study, we use partial least square structural equation modeling (PLS-SEM) via SmartPLS 3 to evaluate the proposed model. Compared with CB-SEM, PLS-SEM is a useful tool for theoretical prediction and exploratory research [92] and works well under the circumstances of a complex model, small sample size, and non-normal data [93]. The measurement model was assessed by the PLS algorithm with maximum iterations and stop criterion setting at 1000 and 10^{-7} , respectively. The structural model was examined by bootstrapping, with settings of 5000 subsamples, bias-corrected and accelerated bootstrap, and two tailed tests (significance level = 5%). Blindfolding remained the default setting of omission distance at 7.

5.1. Reliability and Validity

For the measurement model, we adopted consistency reliability, indicator reliability, convergent validity, and discriminant validity to analyze it. Internal consistency reliability consists of Cronbach's alpha (α) and composite reliability (CR), which are suggested to

be higher than the threshold of 0.7 [94]. Indicator reliability is tested by factor loading, with a recommended critical value of 0.7 [95]. Convergent validity can be evaluated by average variance extracted (AVE), which is preferably greater than 0.5 [96]. For discriminant validity, the Fornell–Larcker criterion was employed, namely, the square root of AVE value for each construct should be larger than the construct’s correlation with any other latent variable [97].

Table 3 compares the reliability and convergent validity of each construct. It can be seen that all items’ factor loadings are higher than the threshold of 0.7, which is quite acceptable. The values of Cronbach’s α and CR range from 0.834 to 0.932 and 0.889 to 0.949, respectively, which indicates high reliability and satisfactory internal consistency. The convergent validity is also confirmed. With AVE values ranging from 0.668 to 0.787 for each construct, the results demonstrate good convergence validity. Furthermore, Table 4 presents the Fornell–Larcker criterion of discriminant validity. It is clear that all the correlation coefficients between the constructs (off-diagonal values) are lower than the square root of average variance values (in bold on the diagonal), which means the constructs differ from each other.

Table 3. Construct reliability and validity.

Construct	Items	Loadings	Cronbach’s α	CR	AVE
ATT	ATT1	0.871	0.932	0.949	0.787
	ATT2	0.895			
	ATT3	0.884			
	ATT4	0.897			
	ATT6	0.889			
CI	CI1	0.885	0.898	0.929	0.765
	CI2	0.873			
	CI3	0.870			
	CI5	0.870			
INN	INN1	0.793	0.889	0.922	0.749
	INN2	0.909			
	INN3	0.871			
	INN4	0.885			
IQ	IQ1	0.846	0.913	0.935	0.742
	IQ2	0.892			
	IQ3	0.882			
	IQ4	0.885			
	IQ5	0.799			
PE	PE1	0.853	0.834	0.889	0.668
	PE2	0.891			
	PE5	0.785			
	PE6	0.731			
PEOU	PEOU1	0.888	0.902	0.931	0.772
	PEOU5	0.855			
	PEOU6	0.886			
	PEOU7	0.885			
SN	SN1	0.803	0.872	0.912	0.723
	SN3	0.849			
	SN4	0.877			
	SN5	0.869			

Table 3. *Cont.*

Construct	Items	Loadings	Cronbach's α	CR	AVE
SYQ	SYQ2	0.849	0.914	0.933	0.700
	SYQ3	0.848			
	SYQ4	0.833			
	SYQ6	0.818			
	SYQ7	0.831			
	SYQ8	0.841			

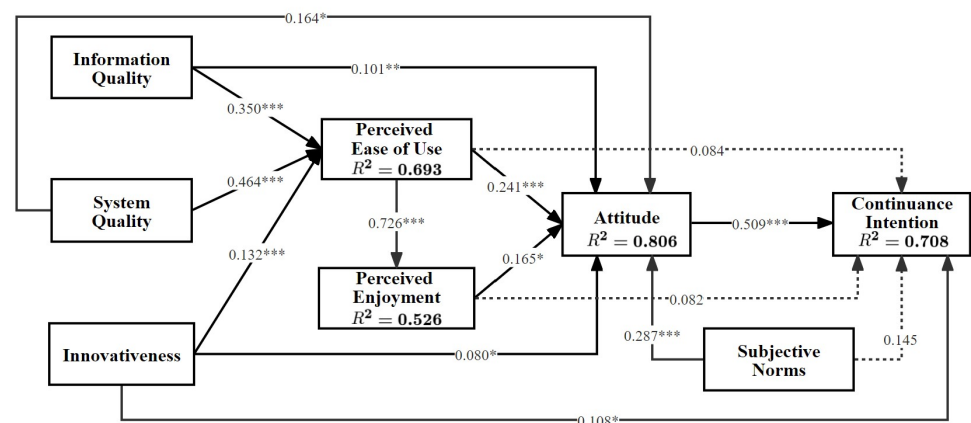
Table 4. Discriminant validity (Fornell–Larcker criterion).

	ATT	CI	INN	IQ	PE	PEOU	SN	SYQ
ATT	0.887							
CI	0.825	0.875						
INN	0.615	0.604	0.865					
IQ	0.695	0.572	0.398	0.861				
PE	0.790	0.720	0.580	0.591	0.818			
PEOU	0.802	0.707	0.528	0.739	0.726	0.879		
SN	0.810	0.746	0.631	0.585	0.773	0.679	0.850	
SYQ	0.810	0.745	0.555	0.725	0.747	0.791	0.746	0.837

5.2. Hypothesis Testing

The results of hypothesis testing are summarized in Table 5. As we can see from the graph, ATT has significant positive influence on CI ($\beta = 0.509$, $p < 0.001$), and, therefore, H1 is verified. For PEOU, it is shown to have a positive correlation with ATT ($\beta = 0.241$, $p < 0.001$), and a significant positive association with PE ($\beta = 0.726$, $p < 0.001$), which support H2a and H2c. For H2c, the T-statistic value peaks at 14.741, indicating the relationship is the strongest among all hypotheses. Additionally, PE can positively influence ATT ($\beta = 0.165$, $p < 0.05$). IQ has significant positive effects on both PEOU ($\beta = 0.350$, $p < 0.001$) and ATT ($\beta = 0.101$, $p < 0.01$). SYQ has significant positive correlation with PEOU ($\beta = 0.464$, $p < 0.001$) and ATT ($\beta = 0.164$, $p < 0.05$). SN has significant positive relationship with ATT ($\beta = 0.287$, $p < 0.001$). Thus, H3a, H4a, H4b, H5a, H5b, and H6a are confirmed. Moreover, INN can positively affect PEOU ($\beta = 0.132$, $p < 0.001$), ATT ($\beta = 0.080$, $p < 0.05$), and CI ($\beta = 0.108$, $p < 0.05$), which means H7a, H7b, and H7c are confirmed. Meanwhile, H2b ($\beta = 0.084$, $p = 0.108$), H3b ($\beta = 0.082$, $p = 0.405$), and H6b ($\beta = 0.145$, $p = 0.138$) are not supported, PEOU ($\beta = 0.123$, $p < 0.01$), PE ($\beta = 0.084$, $p < 0.05$), and SN ($\beta = 0.146$, $p < 0.001$) have indirect relationships with CI via the mediation of ATT. To sum up, twelve of fifteen assumptions are validated by the surveyed data.

The structural model with path coefficients and the results of hypothesis testing is depicted in Figure 2 graphically.



Note: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$; dotted line represents insignificant path.

Figure 2. The tested structural model.

Table 5. Hypothesis testing and indirect effect.

Hypothesis	Path	Path Coefficient	T-Statistics	f^2	p -Value	Result
H1	ATT → CI	0.509	6.817	0.185	0.000	Supported
H2a	PEOU → ATT	0.241	4.022	0.086	0.000	Supported
H2b	PEOU → CI	0.084	1.608	0.008	0.108	Not
H2c	PEOU → PE	0.726	14.741	1.115	0.000	Supported
H3a	PE → ATT	0.165	2.166	0.044	0.030	Supported
H3b	PE → CI	0.082	0.833	0.007	0.405	Not
H4a	IQ → PEOU	0.350	5.097	0.190	0.000	Supported
H4b	IQ → ATT	0.101	2.845	0.021	0.004	Supported
H5a	SYQ → PEOU	0.464	6.508	0.274	0.000	Supported
H5b	SYQ → ATT	0.164	2.467	0.036	0.014	Supported
H6a	SN → ATT	0.287	4.039	0.132	0.000	Supported
H6b	SN → CI	0.145	1.484	0.020	0.138	Not
H7a	INN → PEOU	0.132	3.571	0.039	0.000	Supported
H7b	INN → ATT	0.080	2.017	0.019	0.044	Supported
H7c	INN → CI	0.108	2.105	0.023	0.035	Supported
Indirect Path		Path Coefficient	T-Statistics	p -Value	Bca[2.5%, 97.5%]	
SN → ATT → CI		0.146	4.587	0.000	[0.091, 0.217]	
PEOU → ATT → CI		0.123	3.145	0.002	[0.057, 0.212]	
PE → ATT → CI		0.084	2.314	0.021	[0.019, 0.159]	

In Table 5, the effect size (f^2) is also illustrated. The f^2 value is used to assess the impacts of connected independent variables on a given dependent variable. For the criterion, values of 0.02, 0.15, and 0.35 represent weak, medium, and strong effect sizes, accordingly [98]. The results show that PEOU has a strong effect size on PE, which is the highest among all interactions. While the effect sizes of ATT on CI, IQ on PEOU, and SYQ on PEOU are at a medium level, the effect sizes of PEOU on ATT, PE on ATT, IQ on ATT, SYQ on ATT, SN on CI, INN on PEOU, and INN on CI are relatively weak.

To further test the quality of the proposed model, we refer to the values of the coefficient of determination (R^2) and predictive relevance (Q^2) to evaluate the predictive and explanatory capacity of the model, which are shown in Table 6. The R^2 statistic attempts to measure the combined effects of exogenous variables on a certain endogenous variable, of which the values of 0.25, 0.5, and 0.75 can be described as weak, moderate, substantial levels of predictive accuracy, correspondingly [93]. The Q^2 measure is used to assess the predictive relevance. If the value of Q^2 is higher than zero, it means the related exogenous

constructs have predictive relevance on the given endogenous construct [96]. For this study, the calculated results reveal that the combined impacts of IQ, SYQ, SN, INN, PEOU, and PE can explain 80.6% of the variance in attitude, which exhibits strong predictive accuracy. ATT and INN account for 70.8% of the variance in CI. IQ, SYQ, and INN can predict 69.3% of the variance in PEOU. PEOU can explain 52.6% of the variance in PE. The adjusted R^2 of CI, PEOU, and PE remain at a moderate level of predictive accuracy. Finally, the Q^2 of ATT, CI, PE, and PEOU are all above zero, as shown in Table 6.

Table 6. Values of R^2 and Q^2 .

Construct	R^2	R^2 Adjusted	Q^2
ATT	0.809	0.806	0.627
CI	0.711	0.708	0.533
PE	0.527	0.526	0.339
PEOU	0.695	0.693	0.526

5.3. Multi-Group Analysis

Multi-group analysis (MGA) is used to evaluate whether the group-specific effects of a categorical moderator variable can significantly impact the strength of the relationship between an independent variable and a dependent variable or not [99]. However, PLS-MGA is a non-parametric significance test for the difference between the pre-defined data group results based on the observed PLS-SEM bootstrapping distribution outcomes rather than the distributional assumptions [100,101]. To further test the hypotheses H2b, H3b, and H6b and following the studies of [102,103], MGA is conducted to analyze the moderation effects for the aspects of gender, age, education, level of interest in the Games, average time focusing on Olympic content, app usage time from the first download, app usage frequency, app usage time per session, and app membership. For each moderating variable, the samples were divided into two groups, with PLS maximum iterations and bootstrapping subsamples setting at 1000 and 5000, respectively.

Table 7 presents the outcomes of multi-group moderation analysis. Of the nine moderators mentioned above, only the average time focusing on Olympic content and app usage time per session exhibit significant differences in group-specific results. The influence of PEOU on CI (H2b) is moderated by users' average time focusing on Olympic content per day during the Games significantly ($\Delta\beta = 0.329$, $p = 0.003 < 0.01$). The relationship between PEOU and CI only show significance for addicted fans ($\beta = 0.312$, $p = 0.001 < 0.01$), and statistically insignificant for normal fans ($\beta = -0.016$, $p = 0.798$). Similarly, SN can positively impact CI (H6b) through the moderation of app usage time per session with a significant level at 0.5 ($\Delta\beta = 0.378$, $p = 0.030 < 0.05$). Additionally, the influence only exists for long-time users significantly ($\beta = 0.369$, $p = 0.000 < 0.001$), but not for short-time users ($\beta = -0.008$, $p = 0.955$).

Table 7. Multi-group analysis.

Path	Average Time Focusing on Olympic Content		Path Coefficients-Diff
PEOU → CI	Addicted fans (above 2 h per day) (n = 90) 0.312 **	Normal fans (0–2 h per day) (n = 349) −0.016	0.329 **
App Usage Time per Session			
SN → CI	Long time users (above 30 mins) (n = 263) 0.369 ***	Short time users (0–30 mins) (n = 176) −0.008	0.378 *

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

6. Discussion and Interpretation

In this study, we aim to identify individuals' acceptance and motivations for mobile Olympic viewing through the CMG Mobile App and the findings show that information quality (IQ), system quality (SYQ), subjective norms (SN), innovativeness (INN), perceived ease of use (PEOU), and perceived enjoyment (PE) are key factors for users' attitudes and continuance intention of the Olympic viewing behavior.

For users' acceptance of mobile Olympic viewing, we examine it from two aspects, namely, attitude and continuance intention. The former investigates individuals' holistic recognition of mobile Olympic viewing for their current mental states, while the latter tries to determine their future decisions for the CMG Mobile App, which scrutinizes their intention on a deeper level. To elaborate, for ATT items shown in Table 8, it is clear that users' impression of the Olympic viewing experience, evaluation of innovative services, and the overall appraisal of the app itself are favorable. The cumulative percentage of respondents who scored "5"–"7" ("Agree"–"Strongly agree") for the five questions were 89.1%, 87.0%, 83.4%, 87.2%, and 87.0%, respectively. Among which, items related to the Olympic viewing experience (ATT1, ATT2, and ATT4) suggest relatively more positive manners for their mean values are all above 5.70. In terms of the continuance intention, it can be found in Table 9 that the continuous intention to use, the propensity to use, and willingness to recommend are comparatively weak but still robust relative to users' attitudes. The percentile of participants who scored "5"–"7" ("Agree"–"Strongly agree") for CI items were 85.6%, 72.0%, 82.2%, and 76.3%, respectively. Of which, items relevant to sports viewing (CI1, CI3) indicate a higher level of continuing intention with mean values larger than 5.50, revealing a key impetus for the app's future development. Therefore, RQ1 is answered from what has been discussed in Tables 8 and 9.

Table 8. Descriptive statistics for attitude (N = 439).

Score	ATT1		ATT2		ATT3		ATT4		ATT6	
	Frequency	Ratio	Frequency	Ratio	Frequency	Ratio	Frequency	Ratio	Frequency	Ratio
1	5	1.1%	5	1.1%	4	0.9%	5	1.1%	6	1.4%
2	1	0.2%	0	0.0%	1	0.2%	0	0.0%	1	0.2%
3	4	0.9%	9	2.1%	9	2.1%	6	1.4%	10	2.3%
4	38	8.7%	43	9.8%	59	13.4%	45	10.3%	40	9.1%
5	93	21.2%	88	20.0%	98	22.3%	97	22.1%	100	22.8%
6	176	40.1%	164	37.4%	166	37.8%	181	41.2%	180	41.0%
7	122	27.8%	130	29.6%	102	23.2%	105	23.9%	102	23.2%
Mean	5.80		5.78		5.62		5.72		5.68	
Median	6.00		6.00		6.00		6.00		6.00	
Variance	1.202		1.313		1.304		1.200		1.306	

Table 9. Descriptive statistics for continuance intention (N = 439).

Score	CI1		CI2		CI3		CI5	
	Frequency	Ratio	Frequency	Ratio	Frequency	Ratio	Frequency	Ratio
1	6	1.4%	11	2.5%	8	1.8%	8	1.8%
2	2	0.5%	10	2.3%	2	0.5%	5	1.1%
3	8	1.8%	20	4.6%	12	2.7%	15	3.4%
4	47	10.7%	82	18.7%	56	12.8%	76	17.3%
5	93	21.2%	105	23.9%	104	23.7%	119	27.1%
6	169	38.5%	113	25.7%	168	38.3%	133	30.3%
7	114	26.0%	98	22.3%	89	20.3%	83	18.9%
Mean	5.69		5.26		5.52		5.33	
Median	6.00		5.00		6.00		5.00	
Variance	1.387		2.064		1.497		1.656	

The relationship between attitude and continuance intention is also explored. Results show that attitude can positively predict continuance intention at a significant level ($\beta = 0.509$, $p < 0.001$), which is similar with research of [55,68]. The more positive the

users' attitudes towards mobile Olympic viewing are, the more likely they are willing to continuously use the CMG Mobile App, and even recommend others to use it. Statistical support can be found in Tables 8 and 9. As aforementioned, existing users hold a positive attitude towards mobile Olympic viewing, which underpins a solid growth foundation for continuing usage intention. Therefore, RQ2 is answered.

Despite the impact of ATT, CI is also influenced by INN. Generally speaking, individuals with a higher level of innovativeness usually exhibit a strong sense of curiosity. Whereas the mobile information system always experiences rapid iterations and offers diversified and differentiated services compared with traditional TV, such as EPG, C-user circle, and multi-view VR streaming via the CMG Mobile App. Hence, when novel functions spring up, innovators are more willing to adapt the highly dynamic and instantly changing features in mobile applications, and thereby show a willingness to continue using it in the long run. Such long-term effects of innovativeness have practical significance, which provides guidance for service providers to improve user retention. For example, the video providers could monitor the change propensity of behavior data and launch novel and interesting services tailored to users' tastes to maintain continuing usage intention [89].

In light of attitude, the investigated results demonstrate that PEOU, PE, IQ, SYQ, SN, and INN have positive effects on ATT. For PEOU and PE, the reason is obvious. On the one hand, when users feel that the CMG Mobile App is convenient and easy to operate, they are inclined to think highly of mobile Olympic viewing. On the other hand, users can be pleased by both the Olympic content itself and the entertaining functions on the app. The more fun users get from mobile watching, the more positive they will be towards mobile Olympic viewing. Meanwhile, an interesting finding of this study reveals that there is no direct association between PEOU, PE and CI. The potential reason may be the cyclicity of the Olympic Games, so we argue that in order to foster the future acceptance, there is a need to facilitate positive experiences for existing users.

Additionally, both IQ and SYQ act positively on attitude. As the flagship mobile terminal supported by the exclusive authorized broadcaster CMG, the CMG Mobile App has oceans of Olympic-related content such as pre/post game interviews, field tidbits, etc., besides live streaming. With the advantage of content quality all the time, there is no doubt that the CMG Mobile App can provide users prompt, comprehensive, rich, and reliable Olympic live broadcast and related information. Together with the powerful and stable system offered by the mobile application, users can experience personalized and quality services through functions such as recommendation, subscription, playback, 4K and HDR live streaming, etc., and thereby have a favorable impression on CMG Mobile App.

Moreover, SN and INN are also important drivers for ATT. SN has influence because personal recognition on mobile Olympic viewing can be formed by opinions from their valued ones and reports from media outlets, which implies service providers to utilize the word-of-mouth strategy (e.g., encouraging users to forward group chats, social media circles, etc.) and the publicity of media to attract users in the initial stage. INN reflects an individuals' openness, exploration spirit, and ability to seek novelty. By this logic, innovators are more willing and capable to engage in mobile Olympic viewing (relatively new compared with TV viewing) and potentially hold a positive attitude.

Regarding PEOU, IQ, SYQ, and INN play a critical role when explaining the construct ($\beta_{IQ} = 0.350$, $\beta_{SYQ} = 0.464$, $\beta_{INN} = 0.132$). The rationale of the influence of IQ lies on the main purpose of mobile Olympic viewing, namely obtaining timely, complete, professional, and user-interested content. When users' information demands are satisfied, there is no need for them to spend extra effort to seek information they want, and, therefore, the perception of convenience and ease of use is enhanced. For SYQ, the inclusion of personalization, functionality, well-organized and user friendly interface design, ease of use, and quick response in the mobile system can better guide users' exploration and usage of the CMG Mobile app, so as to improve PEOU [30]. Moreover, INN has a direct impact on PEOU. Users with a stronger innovative inclination usually show a higher commitment

to learning and desire to exploit novelty [104], which enables them to have ease control of mobile viewing.

PE is directly influenced by PEOU, and indirectly affected by IQ, SYQ, and INN via the mediation of PEOU. The correlation between PE and PEOU is the most predictive ($\beta = 0.726$, $f^2 = 1.115$). Specifically, due to the rapid pace of modern life and time fragmentation, the convenience of mobile applications and the accessibility of favorite Olympic Games anytime anywhere have become key factors affecting the perceived pleasure of mobile Olympic viewing. On the other hand, if users constantly experience interruptions, lags, slow loading, or spend a lot of time looking for the content they want, it can frustrate their motivation, engagement, and viewing experience. Conversely, PEOU can induce a strong sense of control and thereby trigger increased PE [103].

Contrary to the studies of [70,71,84], the direct effects of PEOU, PE, and SN on CI are not significant in this study. However, all of them can indirectly influence CI by the mediator of ATT. For PEOU and PE, the potential reasons are summarized as follows: Firstly, given the cyclical nature of the Olympic Games, a lot of people may just be interested in the Olympics, but will not continuously follow other sports events. In this case, even if they felt a sense of pleasure when watching the Games and thought the CMG Mobile App is easy to use, but with the end of the Olympic Games, their motivation to use the app disappeared, and the power of PEOU and PE would diminish on a continuous basis. Secondly, the results of multi-group analysis (Table 7) demonstrate that respondents who spend more than 2 h per day focusing on Olympic content during the Games will be affected by PEOU and exhibit continuance intention for the CMG Mobile App. Such users are more likely to be sports fans, when they find the CMG Mobile App convenient and easy to use, they may regard it as a wise choice to continuously follow other sports events on it in the future. Thirdly, considering the recreational nature of mobile Olympic viewing, it is more a spice of life than a necessity. Olympic viewing behavior acts more like a media carnival of mass participation [105], the enjoyment people perceived from mobile viewing will be cooled down after the event, leading them to think in a more rational way, and the uncertainty of the future often makes them hesitate to continue use.

For SN, the following reasons may make sense. In the early stage of impression formation, the information, opinions, and behaviors from users' social networks can exert influences on their attitudes towards mobile Olympic viewing. Once adopted, the power of social features wanes, as well as their personal experience value. Thus, the motivation to continue using the CMG Mobile App will be made under a private context [82]. However, multi-group analysis (Table 7) manifests that the effect of SN on CI is significant for participants who spend more than 30 mins using the app per session. Such users may not only follow the sports events on the CMG Mobile App, but also other exclusive content of CMG. Generally, they show a higher level of recognition, evaluation, and loyalty to CMG and the app. Therefore, when this group of people is affected by recommendations from their important ones and the publicity of media, they are more likely to try out mobile Olympic viewing and continue to use the CMG Mobile App in the long term. This finding inspires practitioners to revitalize their content resources, provide diverse and unique content, and build brand effects to enhance user engagement. In summary, all the interactions between the constructs are fully revealed and RQ3 is answered.

7. Conclusions, Implication, and Limitation

In this paper, we have investigated users' attitudes and continuance intention of Olympic viewing via mobile app during the Tokyo 2020 Summer and Beijing 2022 Winter Olympics. Combined Technology Acceptance Model and Information System Success Model together, our work modifies them by examining the post-adoption stage and introduces three additional factors, i.e., perceived enjoyment (PE), subjective norms (SN), and innovativeness (INN). Although the antecedents are not new, they still exert influences on users' acceptance of mobile Olympic viewing, which explains 80.6% of the variance in attitude (ATT) and 70.8% of the variance in continuance intention (CI), respectively. The influencing factors of information

quality, system quality, SN, INN, perceived ease of use (PEOU), PE on ATT, and CI have been confirmed. Therein, PEOU and PE are key factors when explaining users' attitudes towards mobile Olympic viewing. Attractive Olympic content and powerful systems also impact users' impressions. Moreover, words and opinions from valued ones exert a huge effect on users' determination as well. Innovators are more receptive and open-minded to adopting mobile Olympic viewing. Meanwhile, ATT and INN directly influence CI at a significant level. The association of PEOU on CI and SN on CI are moderated by the factors of addicted Olympic fans and faithful users, respectively. Through this study, we aim to provide a reference for the relevant business and enhance existing users' adherence. By addressing influencing factors of users' attitudes and continuance intention in the context of mobile Olympic viewing, this study bridges the gap between the constantly changing media practice and the lag of mobile research in academia.

For the theoretical implications: First, the empirical analysis results indicate that the effective predictors—PEOU, PE, and SN in previous continuous intention research, have no significant influences on CI in this study. The main reason is attributed to the cyclicity of the Olympic Games, which implies the importance of positive viewing consumption and the selection of target users. Second, through the moderation analysis, we found that average time focusing on Olympic content and app usage time per session are key moderators rather than age or gender. Therefore, to enhance users' retention, sports fanship, and brand effects need to be considered to forge future willingness to use.

For the practical implications, the findings of the study might facilitate the management of mobile sports viewing information systems. In the initial acceptance stage, relevant practitioners are recommended to provide intriguing and amusing Olympic content, a technically sound and easily operated system, and personalized game-viewing service. Meanwhile, social norms and personal innovation should also be taken into account when choosing a target audience. In the later stage, positive user experience, and constantly updated services are critical to improve continuous engagement.

For the managerial implications, learning and maximizing users' quality of experience is important for media institutions to enhance their products' competition and stickiness. As a powerful mobile platform, the CMG App offers another choice for Olympic viewing. The extra income will be obtained through VIP membership (privileges such as ad-free switching). In this study, our main findings from the user side will provide insights for the next giant sport event. The differentiated membership service can be designed to satisfy the demand of mobile users. The practitioner and content providers will get benefit from the "mobile-first" strategy.

The study also has some limitations. Firstly, all the recruited questionnaires were distributed online, elderly people over 60 years old and teenagers under 18 years old may thereby not be fully investigated. However, they are non-negligible populations as the relevant survey suggests that mobile streaming is a binge for all generations [6]. Moreover, the filling behavior cannot be observed via online investigation, which may lead to misinterpretation and sloppiness in the filling process. Therefore, off-line distribution and samples aged over 60 years old and under 18 years old should be paid more attention to in future work. Secondly, since the Olympic Games are held every four years, other mega sports events such as the World Cup or the NBA is needed to be taken into account to examine users' attitudes and continuance intention of mobile sports viewing in subsequent studies. Thirdly, given that the current work only chose a type of mobile application as an example to investigate users' internal perception, which could somehow restrict the research objects on a relatively small scale. Future research could consider further exploring users' acceptance and potential effects of mobile sports viewing on primary social media platforms and digital applications by employing methods of data mining and computer programming.

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Abbreviations

The following abbreviations are used in this manuscript:

ATT	Attitude
AVE	Average variance extracted
BI	Behavioural intention
CI	Consumer innovation
CMG	China Media Group
CR	Composite reliability
EPG	Electronic program guide
Gen Z	Generation Z
INN	Innovativeness
IOC	International Olympic Committee
IQ	Information quality
IS	Information system
ISS	Information system success
MGA	Multi-group analysis
PE	Perceived enjoyment
PEOU	Perceived ease of use
PLS	Partial least squares
PU	Perceived usefulness
RHB	Rights holding broadcaster
SEM	Structural equation model
SN	Subjective norms
SYQ	System quality
TAM	Technology acceptance model
UHD	Ultra high definition
UI	Usage intention
UTAUT	Unified theory of acceptance and use of technology

Appendix A. Questionnaire Items

Table A1. Constructs and items (Part I).

Items	Source
Information Quality (IQ)	
IQ1: I think I can watch live stream of Olympic events on CMG Mobile App in real time.	Delone and McLean, 1992 [22]; Liou, Hsu, and Chih, 2015 [27]; Cheng, 2012 [77]; Wixom, 2005 [75]
IQ2: I think the Olympic Games schedule and post-game interview provided by CMG Mobile App is prompt.	
IQ3: The Olympic information provided by CMG Mobile App is reliable.	
IQ4: I think the multi-path streaming and multi-view streaming of Olympic events on CMG Mobile App can help me learn more information.	
IQ5: I think the Olympic signal and images of 4K and HDR live streaming provided by CMG Mobile App are of high-quality.	

Table A1. Cont.

Items	Source
System Quality (SYQ)	
SYQ1: When watching the Olympic Games on smartphone, I find CMG Mobile App operate reliably with no crash, etc. *	Delone and McLean, 2003 [25]; Nelson, Todd, and Wixom, 2005 [75]; Sarrab, Al-Shihi, and Al-Manthari, 2015 [76]; Gorla, Somers, and Wong, 2010 [58]; Self-developed
SYQ2: By using functions like search, recommendation, subscription, favorites, playback, etc., I think CMG Mobile App makes it easy to access the Olympic events information I need.	
SYQ3: I think CMG Mobile App can quickly loads all the videos, audio, text and graphics I need for the Olympic events.	
SYQ4: With the release of newer versions, I think CMG Mobile App can fix bugs in time and keep on improving service availability.	
SYQ5: By using the forwarding function provided by CMG Mobile App, I think I can share my favorite live streaming or videos of Olympic events to my family, friends and other social platforms. *	
SYQ6: I think the functionality modularities of CMG Mobile App such as C-user circle, members area, live streaming, etc., can help me utilize the Olympic resources of the app efficiently.	
SYQ7: I think the user interface of CMG Mobile App is clear and well-organised.	
SYQ8: CMG Mobile App can provide me with more relevant information tailored to my preferences or personal interests by using functions like favorites, playback, recommendation, subscription, exclusive Electronic Program Guide (EPG), etc.	
Perceived Ease of Use (PEOU)	
PEOU1: It would be easy for me to operate CMG Mobile App to watch Olympic events.	Davis, 1989 [16]; Okazaki and Mendez, 2013 [106]
PEOU2: Learning to use the innovative applications of CMG Mobile App (e.g., switching to VR, 4K and HDR) does not require a lot of my mental effort. *	
PEOU3: I can flexibly interact with other users by leaving comments and sharing my feelings about the Games through CMG Mobile App's comments interface. *	
PEOU4: Without the aid of a TV set-top box, I can project Olympic events from CMG Mobile app to watch them on TV. * ℓ	
PEOU5: Using mobile devices such as smartphones and tablets, I can watch Olympic events anywhere, anytime.	
PEOU6: I feel that CMG Mobile App provides convenience for me to watch Olympic events.	
PEOU7: Overall, CMG Mobile App is easy to use and operate.	
Subjective Norms (SN)	
SN1: I will consider to use CMG Mobile App to watch Olympics if someone close to me recommends it.	Venkatesh and Davis, 2000 [19]; Bhattacharjee, 2000 [107]
SN2: I would try to use CMG Mobile App if I see loads of related information from the app forwarded on social media or Moments of WeChat. $\wp$	
SN3: I will try to experience the new features of CMG Mobile App (e.g., VR video, multi-path viewing, AI intelligent anchor, digital snowflake, etc.) if someone recommends them to me.	
SN4: The promotion of CMG Olympic program about CMG Mobile App will prompt me to use CMG Mobile App to get Olympic information.	
SN5: If I learn about the function of CMG Mobile App in new media platforms or social media, I will try to use it.	

Note: 1. Items marked with * were deleted in the pre-test because their outer loadings were less than the threshold of 0.7. 2. Items marked with $\wp$ were removed because their discriminant validity did not meet the Fornell–Larcker criterion. 3. Items marked with ℓ were self-developed.

Table A2. Constructs and items (Part II).

Items	Source
Perceived Enjoyment (PE)	
PE1: I find using CMG Mobile App to watch Olympics enjoyable.	Ashfaq, Yun, Yu, and Maria, 2020 [108] Kim, Chan, and Gupta, 2007 [69]; Moon and Kim, 2001 [109]
PE2: The process of using CMG Mobile App to watch Olympic Games provides me with a lot of enjoyment.	
PE3: I find many technologies and functions on the CMG Mobile App interesting, such as VR panoramic video, AI intelligent anchor, digital snowflakes, etc. ϕ	
PE4: Using CMG Mobile App bores me. (reversed item) *	
PE5: Watching Olympic events on CMG Mobile App through mobile devices helps me kill time and entertain myself.	
PE6: When interacting with CMG Mobile App (like using functions of multi-channel live streaming, slow live streaming, VR panoramic video, etc., to watch Olympic events), I do not realize the time elapsed.	
Innovativeness (INN)	
INN1: In general, I am among the first in my circle to acquire innovative technology or applications when it appears.	Parasuraman, 2000 [86]
INN2: I am always open to learning about innovative technologies and applications.	
INN3: I can usually figure out innovative high-tech products and services without the help from others.	
INN4: I usually keep up with the latest applications and technological developments in my areas of interest.	
Attitude (ATT)	
ATT1: I think using mobile devices to watch Olympic events on CMG Mobile App is a good idea.	Taylor and Todd, 1995 [110]; self-developed
ATT2: I think using CMG Mobile App to watch Olympic Games is a wise choice.	
ATT3: I like to use the innovative technology and services of CMG Mobile App.	
ATT4: I think using the innovative technology and services on CMG Mobile App's can bring pleasant Olympic viewing experiences.	
ATT5: If there are important sports events, I would love to pay for the membership of CMG Mobile App to watch more members-only resources. $\ast \ell$	
ATT6: Overall, my attitude towards CMG Mobile App is favourable.	
Continuance Intention (CI)	
CI1: I intend to continue using CMG Mobile App to watch sports events or live streams.	Roca, Chiu, and Martínez, 2006 [111]; Bhattacharjee, 2001 [62]; Venkatesh, Thong, and Xu, 2012 [21]
CI2: I will use CMG Mobile App on a regular basis in the future.	
CI3: Among all homogenous video apps, I prefer to use CMG Mobile App to watch Olympic Games and individual sports event.	
CI4: If I could, I would like to discontinue my use of CMG Mobile App. (reversed item) *	
CI5: I will recommend others to use CMG Mobile App.	

Note: 1. Items marked with * were deleted in the pre-test because their outer loadings were less than the threshold of 0.7. 2. Items marked with ϕ were removed because their discriminant validity did not meet the Fornell–Larcker criterion. 3. Items marked with ℓ were self-developed.

References

1. Wroblewski, L. *Mobile First*, 6th ed.; Editions Eyrolles: New York, NY, USA, 2012; pp. 1–17.
2. StatCounter. Mobile and Tablet Internet Usage Exceeds Desktop for First Time Worldwide. Available online: <https://gs.statcounter.com/press/mobile-and-tablet-internet-usage-exceeds-desktop-for-first-time-worldwide> (accessed on 8 August 2022).
3. data.ai. State of Mobile 2022. Available online: <https://www.data.ai/cn/go/state-of-mobile-2022/> (accessed on 6 August 2022).
4. data.ai. Mobile Users In Two Regions Now Spend 5.7 Hours A Day In Apps. Available online: <https://www.data.ai/en/insights/market-data/q2-2022-market-pulse-regional/> (accessed on 6 August 2022).
5. eMarketer. Media Usage, Worldwide. Available online: <https://forecasts-na1.emarketer.com/5aa6c67d60a15705f86fb232/5a6f72af00ea9b064048c15f> (accessed on 7 August 2022).
6. Adjust. The Mobile Streaming Report 2021. Available online: <https://a.storyblok.com/f/47007/x/b4c7d581f9/mobile-streaming-report-2021-en.pdf> (accessed on 7 August 2022).

7. eMarketer. Digital Video Viewers, China. Available online: <https://forecasts-na1.emarketer.com/5a6a6c5400ea9b064048c063/5a6f74ec00ea9b064048c16e> (accessed on 7 August 2022).
8. IOC. IOC Marketing Fact File 2022 Edition. Available online: https://stillmed.olympics.com/media/Documents/International-Olympic-Committee/IOC-Marketing-And-Broadcasting/IOC-Marketing-Fact-File.pdf?_ga=2.31233407.1734017099.1660922155-1967830441.1649598574 (accessed on 20 August 2022).
9. IOC. IOC Marketing Report Tokyo 2020. Available online: <https://stillmed.olympics.com/media/Documents/International-Olympic-Committee/IOC-Marketing-And-Broadcasting/IOC-Marketing-report-Tokyo-2020.pdf> (accessed on 7 August 2022).
10. of Sport of China, G.A. Beijing Winter Olympics hit Record Ratings. Available online: <https://www.sport.gov.cn/n20001280/n20067608/n20067635/c24060132/content.html> (accessed on 20 August 2022). (In Chinese)
11. IOC. IOC Marketing: Media Guide Olympic Winter Games Beijing 2022. Available online: https://stillmed.olympics.com/media/Documents/Olympic-Games/Beijing-2022/Media-Guide/IOC-Beijing-2022-Media-guide.pdf?_ga=2.175466210.1382776440.1658887361-1967830441.1649598574 (accessed on 27 July 2022).
12. Tao, D.; Fu, P.; Wang, Y.; Zhang, T.; Qu, X. Key characteristics in designing massive open online courses (MOOCs) for user acceptance: An application of the extended technology acceptance model. *Interact. Learn. Environ.* **2022**, *30*, 882–895. [\[CrossRef\]](#)
13. Shaikh, I.M.; Qureshi, M.A.; Noordin, K.; Shaikh, J.M.; Khan, A.; Shahbaz, M.S. Acceptance of Islamic financial technology (FinTech) banking services by Malaysian users: An extension of technology acceptance model. *Foresight* **2020**, *22*, 367–383. [\[CrossRef\]](#)
14. Jokisch, M.R.; Scheling, L.; Doh, M.; Wahl, H.W. Contrasting Internet Adoption in Early and Advanced Old Age: Does Internet Self-Efficacy Matter? *J. Gerontol. Ser. B* **2022**, *77*, 312–320. [\[CrossRef\]](#)
15. Abbasi, A.Z.; Rehman, U.; Fayyaz, M.S.; Ting, D.H.; Shah, M.U.; Fatima, R. Using the playful consumption experience model to uncover behavioral intention to play Multiplayer Online Battle Arena (MOBA) games. *Data Technol. Appl.* **2021**. [\[CrossRef\]](#)
16. Davis, F.D. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Q.* **1989**, *13*, 319–340. [\[CrossRef\]](#)
17. Davis, F.D.; Bagozzi, R.P.; Warshaw, P.R. Extrinsic and intrinsic motivation to use computers in the workplace 1. *J. Appl. Soc. Psychol.* **1992**, *22*, 1111–1132. [\[CrossRef\]](#)
18. Hsiao, C.H.; Yang, C. The intellectual development of the technology acceptance model: A co-citation analysis. *Int. J. Inf. Manag.* **2011**, *31*, 128–136. [\[CrossRef\]](#)
19. Venkatesh, V.; Davis, F.D. A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Manag. Sci.* **2000**, *46*, 186–204. [\[CrossRef\]](#)
20. Venkatesh, V.; Morris, M.G.; Davis, G.B.; Davis, F.D. User acceptance of information technology: Toward a unified view. *MIS Q.* **2003**, *27*, 425–478. [\[CrossRef\]](#)
21. Venkatesh, V.; Thong, J.; Xin, X. Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology. *MIS Q.* **2012**, *36*, 157–178. [\[CrossRef\]](#)
22. DeLone, W.H.; McLean, E.R. Information systems success: The quest for the dependent variable. *Inf. Syst. Res.* **1992**, *3*, 60–95. [\[CrossRef\]](#)
23. Seddon, P.B. A respecification and extension of the DeLone and McLean model of IS success. *Inf. Syst. Res.* **1997**, *8*, 240–253. [\[CrossRef\]](#)
24. Pitt, L.F.; Watson, R.T.; Kavan, C.B. Service quality: A measure of information systems effectiveness. *MIS Q.* **1995**, *19*, 173–187. [\[CrossRef\]](#)
25. DeLone, W.H.; McLean, E.R. The DeLone and McLean model of information systems success: A ten-year update. *J. Manag. Inf. Syst.* **2003**, *19*, 9–30. [\[CrossRef\]](#)
26. Petter, S.; McLean, E.R. A meta-analytic assessment of the DeLone and McLean IS success model: An examination of IS success at the individual level. *Inf. Manag.* **2009**, *46*, 159–166. [\[CrossRef\]](#)
27. Liou, D.K.; Hsu, L.C.; Chih, W.H. Understanding broadband television users' continuance intention to use. *Ind. Manag. Data Syst.* **2015**, *115*. [\[CrossRef\]](#)
28. Tretiakov, A.; Whiddett, D.; Hunter, I. Knowledge management systems success in healthcare: Leadership matters. *Int. J. Med. Inform.* **2017**, *97*, 331–340. [\[CrossRef\]](#)
29. Abbasi, G.A.; Sandran, T.; Ganesan, Y.; Iranmanesh, M. Go cashless! Determinants of continuance intention to use E-wallet apps: A hybrid approach using PLS-SEM and fsQCA. *Technol. Soc.* **2022**, *68*, 101937. [\[CrossRef\]](#)
30. Rui-Hsin, K.; Lin, C.T. The usage intention of e-learning for police education and training. *Policing Int. J.* **2018**, *41*, 98–112. [\[CrossRef\]](#)
31. Tseng, T.H.; Lee, C.T.; Huang, H.T.; Yang, W.H. Success factors driving consumer reuse intention of mobile shopping application channel. *Int. J. Retail. Distrib. Manag.* **2021**, *50*, 76–99. [\[CrossRef\]](#)
32. Xu, Q.; Billings, A.C.; Scott, O.K.; Lewis, M.; Sharpe, S. Gender differences through the lens of Rio: Australian Olympic primetime coverage of the 2016 Rio Summer Olympic Games. *Int. Rev. Sociol. Sport* **2019**, *54*, 517–535. [\[CrossRef\]](#)
33. Fox, A.K.; Royne Stafford, M.B. Olympians on twitter: A linguistic perspective of the role of authenticity, clout, and expertise in social media advertising. *J. Curr. Issues Res. Advert.* **2021**, *42*, 294–309. [\[CrossRef\]](#)
34. Rothenbuhler, E.W. The living room celebration of the Olympic Games. *J. Commun.* **1988**, *38*, 61–81. [\[CrossRef\]](#)

35. Chalip, L.; Green, B.C.; Vander Velden, L. The effects of polysemic structures on Olympic viewing. *Int. J. Sport. Mark. Spons.* **2000**, *2*, 39–58. [\[CrossRef\]](#)
36. McDaniel, S.R.; Chalip, L. Effects of commercialism and nationalism on enjoyment of an event telecast: Lessons from the Atlanta Olympics. *Eur. Sport Manag. Q.* **2002**, *2*, 3–22. [\[CrossRef\]](#)
37. Hede, A.M. Sports-events, tourism and destination marketing strategies: An Australian case study of Athens 2004 and its media telecast. *J. Sport Tour.* **2005**, *10*, 187–200. [\[CrossRef\]](#)
38. Majid, K.; Chandra, R.; Joy, A. Exploring the Growing Interest in the Olympic Winter Games. *Sport Mark. Q.* **2007**, *16*, 25–35.
39. Tang, T.; Cooper, R. The first online Olympics: The interactions between Internet use and sports viewing. *J. Sport. Media* **2011**, *6*, 1–22. [\[CrossRef\]](#)
40. Tang, T.; Cooper, R. Gender, sports, and new media: Predictors of viewing during the 2008 Beijing Olympics. *J. Broadcast. Electron. Media* **2012**, *56*, 75–91. [\[CrossRef\]](#)
41. Cooper, R.; Tang, T. Fans, nonfans, and the Olympics: Predictors of audience's multiplatform experience with the 2008 Beijing Games. *Mass Commun. Soc.* **2012**, *15*, 506–524. [\[CrossRef\]](#)
42. Tang, T.; Cooper, R. Predicting mobile use for big-event content: The role of active choice, habit and structure. *Int. J. Mob. Commun.* **2019**, *17*, 174–190. [\[CrossRef\]](#)
43. Tang, T.; Cooper, R. The most social games: Predictors of social media uses during the 2016 Rio Olympics. *Commun. Sport* **2018**, *6*, 308–330. [\[CrossRef\]](#)
44. Billings, A.; Brown-Devlin, N.; Brown, K.; Devlin, M.B. When 18 days of television coverage is not enough: A six-nation composite of motivations for mobile device use in 2018 Winter Olympic Games. *Mass Commun. Soc.* **2019**, *22*, 535–557. [\[CrossRef\]](#)
45. Devlin, M.B.; Brown, K.A.; Brown-Devlin, N.; Billings, A.C. "My Country is Better Than Yours": Delineating Differences Between Six Countries' National Identity, Fan Identity, and Media Consumption During the 2018 Olympic Games. *Sociol. Sport J.* **2020**, *37*, 254–263. [\[CrossRef\]](#)
46. Billings, A.C.; Brown, N.A.; Brown, K.A.; Guoqing,.; Leeman, M.A.; Ličen, S.; Novak, D.R.; Rowe, D. From pride to smugness and the nationalism between: Olympic media consumption effects on nationalism across the globe. *Mass Commun. Soc.* **2013**, *16*, 910–932. [\[CrossRef\]](#)
47. Billings, A.; Brown, K.; Brown-Devlin, N. Sports draped in the American flag: Impact of the 2014 Winter Olympic telecast on nationalized attitudes. *Mass Commun. Soc.* **2015**, *18*, 377–398. [\[CrossRef\]](#)
48. Länkinen, T. Olympic Mobile Application Succeeds: A Case Study on Sotshi Areena. Master's Thesis, University of Peloponnese, Sparta, Greece, 2016.
49. Kim, K.; Cheong, Y.; Kim, H. Competition and coexistence of sports media: The case of watching the 2014 Sochi Winter Olympic Games. *Asian J. Commun.* **2016**, *26*, 485–503. [\[CrossRef\]](#)
50. Hutchins, B.; Sanderson, J. The primacy of sports television: Olympic media, social networking services, and multi-screen viewing during the Rio 2016 games. *Media Int. Aust.* **2017**, *164*, 32–43. [\[CrossRef\]](#)
51. CNTV. Shen Haixiong: Adhere to Integrity and Innovation, Deepen Media Integration, Strive to Build a World-Class New Mainstream Media. Available online: <https://baijiahao.baidu.com/s?id=1735699454197146435&wfr=spider&for=pc> (accessed on 19 August 2022). (In Chinese)
52. CNTV. CCTV Tokyo Olympic Games Financial Media Viewing Report are off the Chart. Available online: <http://1118.cctv.com/2021/07/30/ARTI2xXWZvqVP5Uyk5Fi2xxk210730.shtml> (accessed on 19 August 2022). (In Chinese)
53. CNTV. CMG Mobile App Launched "Digital Snowflake" to help the Winter Olympics, Seize the Opportunity of Sports Communication to Overtake. Available online: <https://1118.cctv.cn/2022/01/20/ARTIuvk50prrx1d161WJsi6b220120.shtml> (accessed on 19 August 2022). (In Chinese)
54. CNTV. The Total Number of Video View Broke 800 million! CMG Mobile App's Winter Olympic Games Report is Here. Available online: <http://1118.cctv.com/2022/02/23/ARTI7DMcqiYldhkyFyVsIZS220223.shtml> (accessed on 19 August 2022). (In Chinese)
55. Amoroso, D.; Lim, R. The mediating effects of habit on continuance intention. *Int. J. Inf. Manag.* **2017**, *37*, 693–702. [\[CrossRef\]](#)
56. Ajzen, I. The theory of planned behavior. *Organ. Behav. Hum. Decis. Process.* **1991**, *50*, 179–211. 52576.n208. [\[CrossRef\]](#)
57. Venkatesh, V. Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Inf. Syst. Res.* **2000**, *11*, 342–365. [\[CrossRef\]](#)
58. Gorla, N.; Somers, T.M.; Wong, B. Organizational impact of system quality, information quality, and service quality. *J. Strateg. Inf. Syst.* **2010**, *19*, 207–228. [\[CrossRef\]](#)
59. Wu, B.; Zhang, C. Empirical study on continuance intentions towards E-Learning 2.0 systems. *Behav. Inf. Technol.* **2014**, *33*, 1027–1038. [\[CrossRef\]](#)
60. Jeng, M.Y.; Yeh, T.M.; Pai, F.Y. The Continuous Intention of Older Adult in Virtual Reality Leisure Activities: Combining Sports Commitment Model and Theory of Planned Behavior. *Appl. Sci.* **2020**, *10*, 75–09. [\[CrossRef\]](#)
61. Matute-Vallejo, J.; Melero-Polo, I. Understanding online business simulation games: The role of flow experience, perceived enjoyment and personal innovativeness. *Australas. J. Educ. Technol.* **2019**, *35*. [\[CrossRef\]](#)
62. Bhattacharjee, A. Understanding information systems continuance: An expectation-confirmation model. *MIS Q.* **2001**, *25*, 351–370. [\[CrossRef\]](#)

63. Limayem, M.; Hirt, S.G.; Cheung, C.M. How habit limits the predictive power of intention: The case of information systems continuance. *MIS Q.* **2007**, *31*, 705–737. [\[CrossRef\]](#)
64. Franque, F.B.; Oliveira, T.; Tam, C.; de Oliveira Santini, F. A meta-analysis of the quantitative studies in continuance intention to use an information system. *Internet Res.* **2020**, *31*, 123–158. [\[CrossRef\]](#)
65. Nabavi, A.; Taghavi-Fard, M.T.; Hanafizadeh, P.; Taghva, M.R. Information technology continuance intention: A systematic literature review. *Int. J. E-Bus. Res. (IJEER)* **2016**, *12*, 58–95. [\[CrossRef\]](#)
66. Fishbein, M.; Ajzen, I. Belief, attitude, intention, and behavior: An introduction to theory and research. *Philos. Rhetor.* **1977**, *10*, 244. [\[CrossRef\]](#)
67. Liang, T.P.; Ling, Y.L.; Yeh, Y.H.; Lin, B. Contextual factors and continuance intention of mobile services. *Int. J. Mob. Commun.* **2013**, *11*, 313–329. [\[CrossRef\]](#)
68. Wu, B.; Chen, X. Continuance intention to use MOOCs: Integrating the technology acceptance model (TAM) and task technology fit (TTF) model. *Comput. Hum. Behav.* **2017**, *67*, 221–232. [\[CrossRef\]](#)
69. Kim, H.W.; Chan, H.C.; Gupta, S. Value-based adoption of mobile internet: An empirical investigation. *Decis. Support Syst.* **2007**, *43*, 111–126. [\[CrossRef\]](#)
70. Lin, K.M. e-Learning continuance intention: Moderating effects of user e-learning experience. *Comput. Educ.* **2011**, *56*, 515–526. [\[CrossRef\]](#)
71. Hung, S.W.; Chang, C.W.; Ma, Y.C. A new reality: Exploring continuance intention to use mobile augmented reality for entertainment purposes. *Technol. Soc.* **2021**, *67*, 101757. [\[CrossRef\]](#)
72. Chinomona, R. Mobile gaming perceived enjoyment and ease of play as predictors of student attitude and mobile gaming continuance intention. *Mediterr. J. Soc. Sci.* **2013**, *4*, 237. [\[CrossRef\]](#)
73. Venkatesh, V.; Speier, C.; Morris, M.G. User acceptance enablers in individual decision making about technology: Toward an integrated model. *Decis. Sci.* **2002**, *33*, 297–316. [\[CrossRef\]](#)
74. Sun, H.; Zhang, P. Causal relationships between perceived enjoyment and perceived ease of use: An alternative approach. *J. Assoc. Inf. Syst.* **2006**, *7*, 24. [\[CrossRef\]](#)
75. Nelson, R.R.; Todd, P.A.; Wixom, B.H. Antecedents of information and system quality: An empirical examination within the context of data warehousing. *J. Manag. Inf. Syst.* **2005**, *21*, 199–235. [\[CrossRef\]](#)
76. Sarrab, M.; Hafedh, A.S.; Bader, A.M. System quality characteristics for selecting mobile learning applications. *Turk. Online J. Distance Educ.* **2015**, *16*, 18–27. [\[CrossRef\]](#)
77. Cheng, Y.M. The effects of information systems quality on nurses' acceptance of the electronic learning system. *J. Nurs. Res.* **2012**, *20*, 19–31. [\[CrossRef\]](#) [\[PubMed\]](#)
78. Zhou, T. Examining the critical success factors of mobile website adoption. *Online Inf. Rev.* **2011**, *35*, 636–652. [\[CrossRef\]](#)
79. Park, E.; Kim, K.J. An integrated adoption model of mobile cloud services: Exploration of key determinants and extension of technology acceptance model. *Telemat. Inform.* **2014**, *31*, 376–385. [\[CrossRef\]](#)
80. Xu, Q.; Hou, X.; Xiao, T.; Zhao, W. Factors Affecting Medical Students' Continuance Intention to Use Mobile Health Applications. *J. Multidiscip. Healthc.* **2022**, *15*, 471–484. [\[CrossRef\]](#)
81. Kim, J.h.; Kim, G.j.; Choi, H.j.; Seok, B.i.; Lee, N.h. Effects of social network services (SNS) subjective norms on SNS addiction. *J. Psychol. Afr.* **2019**, *29*, 582–588. [\[CrossRef\]](#)
82. Yan, M.; Filieri, R.; Raguseo, E.; Gorton, M. Mobile apps for healthy living: Factors influencing continuance intention for health apps. *Technol. Forecast. Soc. Chang.* **2021**, *166*, 120644. [\[CrossRef\]](#)
83. Zhao, Y.; Wang, N.; Li, Y.; Zhou, R.; Li, S. Do cultural differences affect users'e-learning adoption? A meta-analysis. *Br. J. Educ. Technol.* **2021**, *52*, 20–41. [\[CrossRef\]](#)
84. Ashrafi, A.; Zareravasan, A.; Rabiee Savoji, S.; Amani, M. Exploring factors influencing students' continuance intention to use the learning management system (LMS): A multi-perspective framework. *Interact. Learn. Environ.* **2020**, *30*, 1475–1497. [\[CrossRef\]](#)
85. Weng, G.S.; Zailani, S.; Iranmanesh, M.; Hyun, S.S. Mobile taxi booking application service's continuance usage intention by users. *Transp. Res. Part D Transp. Environ.* **2017**, *57*, 207–216. [\[CrossRef\]](#)
86. Parasuraman, A. Technology Readiness Index (TRI) a multiple-item scale to measure readiness to embrace new technologies. *J. Serv. Res.* **2000**, *2*, 307–320. [\[CrossRef\]](#)
87. Li, L.; Wang, Z.; Li, Y.; Liao, A. Impacts of consumer innovativeness on the intention to purchase sustainable products. *Sustain. Prod. Consum.* **2021**, *27*, 774–786. [\[CrossRef\]](#)
88. Ramayah, T.; Ling, N.S.; Taghizadeh, S.K.; Rahman, S.A. Factors influencing SMEs website continuance intention in Malaysia. *Telemat. Inform.* **2016**, *33*, 150–164. [\[CrossRef\]](#)
89. Lu, J. Are personal innovativeness and social influence critical to continue with mobile commerce? *Internet Res.* **2014**, *24*, 134–159. [\[CrossRef\]](#)
90. Lee, M.S. Effects of personal innovativeness on mobile device adoption by older adults in South Korea: The moderation effect of mobile device use experience. *Int. J. Mob. Commun.* **2019**, *17*, 682–702. [\[CrossRef\]](#)
91. Marcoulides, G.A.; Saunders, C. Editor's comments: PLS: A silver bullet? *MIS Q.* **2006**, *30*, iii–ix. [\[CrossRef\]](#)
92. Ringle, C.M.; Sarstedt, M.; Straub, D.W. Editor's comments: A critical look at the use of PLS-SEM in "MIS Quarterly". *MIS Q.* **2012**, *36*, iii–xiv. [\[CrossRef\]](#)

93. Hair, J.F., Jr.; Sarstedt, M.; Hopkins, L.; Kuppelwieser, V.G. Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *Eur. Bus. Rev.* **2014**, *26*, 106–121. [\[CrossRef\]](#)
94. Bagozzi, R.P.; Yi, Y. On the evaluation of structural equation models. *J. Acad. Mark. Sci.* **1988**, *16*, 74–94. [bf02723327](#). [\[CrossRef\]](#)
95. Wixom, B.H.; Watson, H.J. An empirical investigation of the factors affecting data warehousing success. *MIS Q.* **2001**, *25*, 17–41. [\[CrossRef\]](#)
96. Hair, J.F.; Ringle, C.M.; Sarstedt, M. PLS-SEM: Indeed a silver bullet. *J. Mark. Theory Pract.* **2011**, *19*, 139–152. [\[CrossRef\]](#)
97. Fornell, C.; Larcker, D.F. Evaluating structural equation models with unobservable variables and measurement error. *J. Mark. Res.* **1981**, *18*, 39–50. [\[CrossRef\]](#)
98. Chin, W.W.; Marcolin, B.L.; Newsted, P.R. A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study. *Inf. Syst. Res.* **2003**, *14*, 189–217. [\[CrossRef\]](#)
99. Sarstedt, M.; Henseler, J.; Ringle, C. Multi-Group Analysis in Partial Least Squares (PLS) Path Modeling: Alternative Methods and Empirical Results. *Adv. Int. Mark.* **2011**, *22*, 195–218. [\[CrossRef\]](#)
100. Ringle, C.M.; Wende, S.; Becker, J.M. SmartPLS 3: Multigroup Analysis (MGA). Available online: <https://www.smartpls.com/documentation/algorithms-and-techniques/multigroup-analysis/> (accessed on 16 August 2022).
101. Henseler, J.; Ringle, C.M.; Sinkovics, R.R. The use of partial least squares path modeling in international marketing. In *New Challenges to International Marketing*; Emerald Group Publishing Limited: Bingley, UK, 2009; pp. 307–310. [\[CrossRef\]](#)
102. Kasilingam, D.L. Understanding the attitude and intention to use smartphone chatbots for shopping. *Technol. Soc.* **2020**, *62*, 101280. [\[CrossRef\]](#)
103. Akdim, K.; Casaló, L.V.; Flavián, C. The role of utilitarian and hedonic aspects in the continuance intention to use social mobile apps. *J. Retail. Consum. Serv.* **2022**, *66*, 102888. [\[CrossRef\]](#)
104. Jo, H. Understanding the key antecedents of users' continuance intention in the context of smart factory. *Technol. Anal. Strateg. Manag.* **2021**, 1–14. [\[CrossRef\]](#)
105. Piper, H.; Garratt, D. Olympic dreams and social realities: A Foucauldian analysis of legacy and mass participation. *Sociol. Res. Online* **2013**, *18*, 150–159. [\[CrossRef\]](#)
106. Okazaki, S.; Mendez, F. Exploring convenience in mobile commerce: Moderating effects of gender. *Comput. Hum. Behav.* **2013**, *29*, 1234–1242. [\[CrossRef\]](#)
107. Bhattacharjee, A. Acceptance of e-commerce services: The case of electronic brokerages. *IEEE Trans. Syst. Man, Cybern.-Part A Syst. Hum.* **2000**, *30*, 411–420. [\[CrossRef\]](#)
108. Ashfaq, M.; Yun, J.; Yu, S.; Loureiro, S.M.C. I, Chatbot: Modeling the determinants of users' satisfaction and continuance intention of AI-powered service agents. *Telemat. Inform.* **2020**, *54*, 101–473. [\[CrossRef\]](#)
109. Moon, J.W.; Kim, Y.G. Extending the TAM for a World-Wide-Web context. *Inf. Manag.* **2001**, *38*, 217–230. [s0378-7206\(00\)00061-6](#). [\[CrossRef\]](#)
110. Taylor, S.; Todd, P.A. Understanding information technology usage: A test of competing models. *Inf. Syst. Res.* **1995**, *6*, 144–176. [\[CrossRef\]](#)
111. Roca, J.C.; Chiu, C.M.; Martínez, F.J. Understanding e-learning continuance intention: An extension of the Technology Acceptance Model. *Int. J. Hum.-Comput. Stud.* **2006**, *64*, 683–696. [\[CrossRef\]](#)