

# Development and Validation of an Esports Stadium Atmosphere Measurement Scale: A Case Study in Thailand

Krittidetch Anan & Kassara Sukpatch\*

Graduate School of Tourism Management, National Institute of Development Administration,  
Bangkok, 10240 Thailand

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## Abstract

Esports has emerged as a rapidly growing industry, attracting significant attention and generating revenue across multiple sectors through large-scale events. These events offer unique experiences, with fans participating both online through streaming platforms and offline by attending in person. The stadium atmosphere provides a distinct and immersive experience unavailable in online viewing, making it a key factor in drawing live audiences. While the atmosphere in traditional sports stadiums has been extensively studied, limited research exists on this topic in the context of esports. This study aimed to investigate the factors influencing esports stadium atmosphere and to develop a reliable and valid instrument to measure it, referred to as the Esports Stadium Atmosphere (ESSA) scale. A mixed-method approach was employed across three steps. Step I involved a qualitative exploration, including literature reviews, in-depth interviews, and expert panel evaluations, generating 81 potential items. Step II (n = 200) used exploratory factor analysis (EFA) to refine the scale, revealing a 6-factor, 29-item structure. Step III (n = 340) validated the scale using confirmatory factor analysis (CFA), confirming the model's dimensionality, reliability, and validity, with the final ESSA scale comprising six factors and 21 items. The results indicate that "stage devices" and "in-game related items and merchandise" possess distinct characteristics unique to the esports setting. Another noteworthy finding is that fan demographics and behavior differ significantly between traditional sports and esports. The results provide valuable insights and practical recommendations for esports organizers and management to enhance live event experiences through a validated ESSA scale.

**Keywords:** Esports, Stadium atmosphere, Offline event, Scale development

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\* Corresponding Author

e-mail: krittidetch.anan@gmail.com

## Introduction

Esports, or competitive gaming, has witnessed remarkable growth over the past decade, establishing itself as a significant segment of the global entertainment industry. Recent reports indicate that the global esports market revenue exceeded \$1.38 billion in 2022 and is projected to continue growing, fueled by sponsorships, media rights, and merchandise sales (Newzoo, 2023). Live esports events have become a cornerstone of this growth, offering immersive fan experiences and fostering community connections that digital streaming alone cannot replicate (Hamari & Sjöblom, 2017). Offline esports events, particularly those held in stadiums, highlight the rising popularity of in-person attendance among enthusiasts. Live esports events provide a multi-sensory experience, combining the intensity of competitive gameplay with the collective energy of a live audience. Iconic events such as The International, the League of Legends World Championship, and ESL One draw thousands of spectators to global venues, capitalizing on the communal aspect of the fandom. The stadium atmosphere, shaped by physical design and audiovisual elements, enhances excitement, engagement, and emotional connections among attendees (Seo, 2013). These events demonstrate how a well-crafted environment can elevate the overall spectator experience.

The stadium atmosphere is deeply rooted in the principles of Environmental Psychology, particularly Mehrabian and Russell's (1974) stimulus-organism-response (SOR) model. This framework explains how environmental stimuli (e.g., lighting, sound, seating arrangements) influence emotional responses (organisms), which in turn drive behavioral outcomes (responses). In the context of esports, environmental factors, such as immersive audiovisual systems, dynamic stage designs, and fan engagement zones, serve as stimuli that evoke emotional reactions like excitement and immersion. These responses influence key behaviors, including cheering, purchasing merchandise, and intentions to attend future events. The SOR model underscores the importance of designing esports venues that cater to sensory and emotional engagement to optimize the spectator's experience.

The principles of Social Identity Theory (Tajfel & Turner, 1986) further elucidate the role of the stadium atmosphere in esports. According to this theory, individuals derive a sense of belonging and self-esteem from their association with social groups. In esports, this manifests through fans' identification with teams, players, or even the gaming community as a whole. Collective behaviors such as chanting, wearing team colors, or participating in cosplay

create a shared group identity, enhancing emotional involvement and fostering loyalty. High-density social interactions in stadiums amplify this sense of belonging, making live events a unique and emotionally charged experience. The stadium atmosphere becomes a platform for spectators to express and strengthen their identity within the esports community.

While fans can easily access esports matches online, attracting them to offline events requires creating a compelling stadium atmosphere and enhancing the in-person experience. Recent academic research on stadium atmosphere, primarily centered on traditional sports and informed by Urich & Benkenstein's (2010) study rooted in environmental psychology and Mehrabian and Russell's (1974) Stimulus-Organism-Response (S-O-R) Theory, has concentrated on environmental stimuli, including organizer-generated elements, spectator behavior, game action, and stadium architecture. However, stadium atmosphere studies in esports is limited; for instance, Seo (2013) and Taylor (2016), concentrated on the social aspects, although the culture and traditions within esports communities enhance the atmosphere, thus lacking comprehensive coverage comparable to studies in traditional sports. Though live esports events are becoming more and more popular, most esports studies concentrate on online viewership, or virtual fan identity instead of the dynamic in-venue (stadium or arena) environment and past research is lacking in holistic frameworks to evaluate the unique atmosphere in esports stadiums, which remains underexplored compared to traditional sports. The current literature has gaps in a verified framework for the atmosphere of esports events. Xiao (2020) revealed that the motivations of esports spectators markedly diverge from those of conventional sports fans, hence requiring a customized methodology for examining esports event contexts. This study aims to develop and validate a conceptual and measurement model of Esports Stadium Atmosphere (ESSA) by employing the principles of Environmental Psychology and Social Identity Theory to determine the key factors that characterize and impact the atmosphere in live esports events, thus bridging the existing gap and modifying conventional sport frameworks. Esports organizers, marketers, and event planners may be able to use the results to better understand esports fans' behavior and provide an optimal experience for spectators.

### Objectives

1. To identify key factors influencing the atmosphere in esports stadiums.
2. To develop a reliable and comprehensive scale for measuring the Esports Stadium Atmosphere (ESSA) construct.

### Conceptual Framework

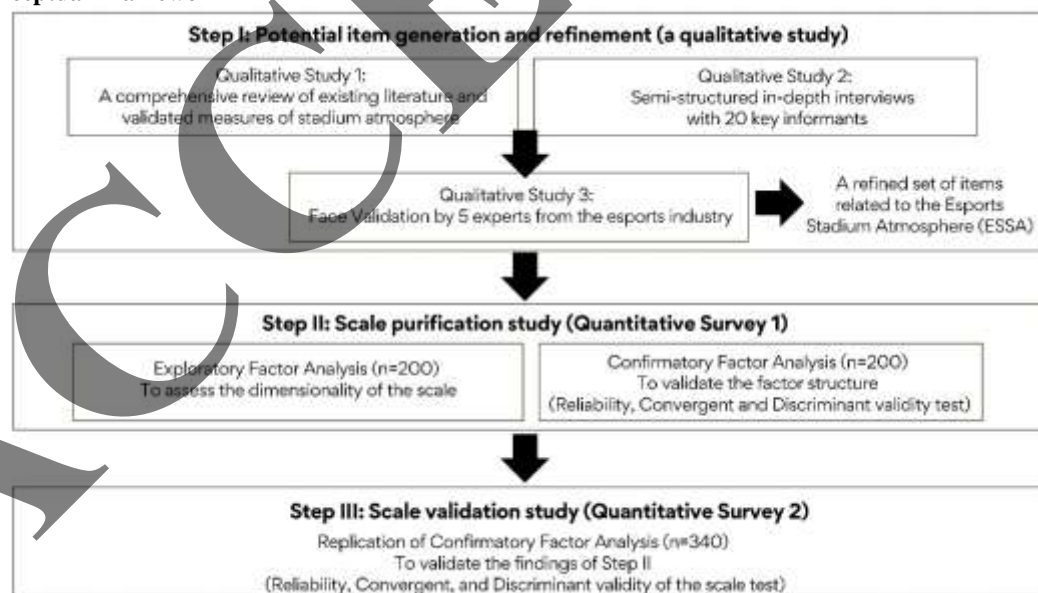


Figure 1 Conceptual framework

### Literature Review

#### The transformative rise of esports

The rapid rise of electronic sports (esports) has fundamentally transformed gaming into a dynamic and influential sector within the global entertainment industry. Esports integrates virtual environments, professional competition, and entertainment into a cohesive, multifaceted experience, creating paradigms distinct from traditional gaming and sports (Carrillo Vera & Aguado Terrón, 2019). Technological advancements, particularly high-speed

internet and mobile streaming platforms, have redefined the spectator experience. The ability to stream live tournaments across platforms has expanded esports' global audience, attracting millions of viewers (Brown et al., 2018). This convergence of media and gaming has globalized esports, enabling fans worldwide to follow tournaments in real time, further fueling its growth (Jenny et al., 2017). Esports has experienced explosive growth, with global viewership reaching 474 million in 2021 and projected to exceed 577 million by 2024 (Newzoo, 2020; Statista, 2022). Its predominantly young, tech-savvy, and highly engaged audience with significant purchasing power has made esports an ideal platform for advertisers (Nielsen, 2019). Advertising and sponsorships now constitute a substantial share of industry revenue, with brands collaborating with game developers, teams, and tournaments to enhance visibility and financial stability (Scholz, 2019). These partnerships have cemented esports as a vital platform for reaching global youth audiences (Seo, 2016; Taylor, 2012).

The broader sports, events, and entertainment industries have increasingly embraced esports due to growing consumer demand and the proliferation of organized video game competitions (Funk et al., 2018; Hallmann & Giel, 2018). Modern esports events, including leagues and tournaments, attract thousands to physical venues (Taylor, 2016) while drawing hundreds of thousands of online viewers on platforms like Twitch and YouTube (Hilvoorde & Pot, 2016). These tournaments create a collaborative ecosystem, connecting players, fans, sponsors, and game developers across various platforms (Kim et al., 2020; Scholz, 2019). Esports events also contribute significantly to local economies, particularly benefiting the hospitality sector as fans spend on lodging, dining, and transportation (Jenny et al., 2017). Hosting events enhances the brand value of host cities and serves as a hub for technological innovation. Globally, major cities in Western Europe, the U.S., South Korea, and China have become esports hubs. While many events initially utilized venues designed for traditional sports, purpose-built esports facilities are now emerging to meet the demands of this rapidly growing market (Scholz, 2019). Esports stands at the intersection of technology, entertainment, and sports, creating a unique ecosystem driven by players, spectators, and corporate sponsors. Its continued expansion highlights its transformative potential and growing influence in the global entertainment landscape.

#### **Esports consumption: online vs offline experiences**

Esports consumption can be broadly categorized into online and offline experiences, each offering unique benefits and appealing to different segments of the audience. Existing research has explored various aspects of esports consumption, including engagement and motivations (Hamari & Sjöblom, 2017), social and economic impacts (Jenny et al., 2017), cultural and global expansion (Seo, 2016), and psychological and behavioral effects (Bányai et al., 2019).

Online esports consumption refers to viewing tournaments and events through streaming platforms like Twitch, YouTube Gaming, and Huya. This format has gained immense popularity due to its accessibility and convenience, enabling fans worldwide to follow events from anywhere (Scholz, 2019). Online viewership is marked by its interactivity, featuring real-time chats, live commentary, and social engagement tools that foster a participatory culture (Seo, 2016). These elements allow fans to engage directly with streamers, teams, and fellow viewers, creating a virtual community experience (Taylor, 2012). Conversely, offline esports consumption involves attending live events at arenas, stadiums, or other venues, which have surged in popularity with major tournaments like The International (DOTA 2) and the League of Legends World Championship drawing tens of thousands of attendees (Taylor, 2016). The in-person experience is characterized by its immersive and communal nature, as fans enjoy the electrifying atmosphere, direct engagement with players, and the spectacle of live competition (Seo, 2016). Features such as large screens, advanced sound systems, and the collective energy of the crowd amplify the experience, creating an unmatched environment (Hallmann & Giel, 2018). Live events also foster a sense of community by enabling face-to-face interactions with fans, players, and sponsors, strengthening personal connections within the esports ecosystem (Kim et al., 2020). Attendees often access exclusive opportunities such as meet-and-greets with players, special merchandise, and unique in-game content, enhancing the overall value of the live experience.

In conclusion, the primary differences between online and offline esports consumption lie in accessibility and immersion. Online consumption offers global reach and lower costs, making it highly accessible, while offline events provide a richer emotional connection and a tangible sense of community. As esports evolves, a hybrid model that combines the accessibility of online platforms with the immersive experience of offline events may emerge as the future of esports consumption (Scholz, 2019; Seo, 2016). Despite the rapid growth of esports, most research focuses predominantly on online consumption (Gandolfi, 2016; Hamari & Sjöblom, 2017; Seo, 2016), while studies on offline consumption remain limited.

#### **Stadium atmosphere**

According to Kim and Walker (2012), sporting events elicit strong emotional engagement from spectators, significantly influencing their attention and connection to the event. This emotional engagement is equally critical in esports, where increasing attendance at live events has become a priority for organizers. In traditional sports, stadium attendance is shaped by factors beyond the game itself. Research highlights the importance of supplementary experiences, such as recreational activities in fan zones, entertainment shows, and family-friendly attractions, in attracting fans to live events (Soygüden et al., 2019; Theodorakis et al., 2011).

The atmosphere within a stadium has long been recognized as a critical factor in attracting fans to live sporting events. Research underscores that the stadium atmosphere significantly impacts spectators' emotional engagement, consumption behaviors, and intentions to attend future events or recommend the experience to others (Soygüden et al., 2019). Factors such as a vibrant, interactive environment and well-maintained facilities contribute not only to enhanced fan satisfaction but also to fulfilling their emotional and entertainment needs, aligning with sports organizations' marketing and financial objectives (Soygüden, 2016; Uhrich & Benkenstein, 2010).

In traditional sports, the stadium atmosphere is shaped by a combination of physical, social, and event-related factors. The physical environment includes architecture, seating arrangements, lighting, sound systems, and technological enhancements like high-definition video boards and dynamic sound systems, which create an immersive experience (Wakefield & Blodgett, 1999). Accessibility to amenities and a thoughtfully designed layout also impact crowd density and movement, further influencing spectators' perception of excitement. Social dynamics within the stadium are another vital component. The behavior, participation, and interaction of fans generate emotional energy that enhances the overall experience. Collective activities such as cheers, chants, and rituals foster a sense of shared identity and camaraderie, amplifying the emotional intensity of the event. High social density, particularly in sections populated by passionate fans, further elevates the atmosphere, making it more lively and engaging. Event-related factors such as the competitiveness of the teams, the stakes of the match, and the performance of key players are also critical in shaping the atmosphere. High-stakes games or moments of heightened tension, such as penalty shots or last-minute goals, create an electric environment that captivates spectators (Cunningham et al., 2018). Additionally, the efforts of event organizers, including pre-game shows, halftime entertainment, and interactive fan engagement activities, play a pivotal role in maintaining a positive and energetic atmosphere throughout the event.

While much of the research on stadium atmosphere has focused on traditional sports, its importance is increasingly recognized in esports. Unlike traditional sports, esports integrates the physical and digital realms, creating unique opportunities to enhance the stadium atmosphere. Social elements such as cheering behavior, cosplay, and fan interactions contribute significantly to the esports atmosphere, mirroring the communal engagement seen in traditional sports. Moreover, audiovisual quality plays a more prominent role in esports. High-definition displays, synchronized sound effects, and immersive lighting blur the boundaries between the game and the physical environment, making esports stadiums an extension of the gameplay itself (Cunningham et al., 2018). Additional elements such as pre- and post-game entertainment, meet-and-greet opportunities with players, digital giveaways, and fan zones further cater to the preferences of esports audiences, creating a holistic and interactive experience.

#### **Related theory: Environmental Psychology and Social Identity Theory**

The concept of environmental psychology provides a valuable lens through which to examine the impact of the stadium atmosphere on spectators' experiences and behaviors in a sports context. Environmental psychology emphasizes the interplay between individuals and their surrounding environments, focusing on how physical settings influence human emotions, perceptions, and actions (Gifford, 2014). In the context of sports, the stadium is more than a venue for competition; it is a designed environment that shapes fan engagement, team loyalty, and overall satisfaction.

Environmental psychology posits that built environments can elicit specific emotional and behavioral responses (Bell et al., 2001). In sports stadiums, this dynamic manifests through factors such as architectural design, crowd density, acoustics, lighting, and signage, which collectively contribute to the "atmosphere" or sense of place. Theories like Mehrabian and Russell's (1974) stimulus-organism-response (SOR) framework explain how environmental stimuli (e.g., noise levels, seating arrangements) affect spectators' emotional states, which in turn influence their behaviors, such as cheering, chanting, or purchasing merchandise. In the field of sports marketing, researchers are specifically concerned with stadium environments (Uhrich & Benkenstein, 2010). These studies include qualitative and quantitative surveys of spectators feeling an atmosphere, based on environmental psychology theories and a stimulus-response paradigm.

Furthermore, social identity theory also provides a critical framework for understanding the stadium atmosphere's effects. This theory emphasizes that individuals derive a sense of self-esteem and identity from their membership in social groups (Tajfel & Turner, 1986). In a sports setting, the collective identity of fans contributes to the emotional intensity of the experience. When the stadium atmosphere reflects strong in-group cohesion - through team colors, chants, and rituals - it fosters a sense of belonging that enhances spectator satisfaction and loyalty (Branscombe & Wann, 1991).

In summary, Esports, a rapidly growing global industry, is driving significant economic impacts across technology, entertainment, and tourism sectors. In countries like Thailand, where esports is gaining popularity, the industry presents opportunities not only as a cultural phenomenon but also as a commercial venture actively supported by the government (Carrillo Vera & Aguado Terrón, 2019). However, despite this support, international offline esports tournaments in Thailand remain infrequent, with live attendance often falling short compared to the substantial online viewership. Live spectator attendance is a key indicator of event success, providing a tangible demonstration of esports' local market potential to game publishers and tournament organizers. A critical challenge for esports event organizers is attracting spectators to physical venues, where the stadium atmosphere plays a pivotal role. In traditional sports,

stadium atmosphere has been widely studied and recognized as a major driver of fan satisfaction, engagement, and repeat attendance. Their findings underscore the importance of creating an engaging and immersive environment to draw live audiences. In contrast, the esports industry has only recently begun to explore the factors influencing atmosphere in esports arenas. Creating a vibrant and engaging environment is crucial to converting online viewers into live spectators, thereby boosting the commercial viability of offline tournaments. Unlike traditional sports, esports events heavily rely on advanced audiovisual technologies, real-time commentary, and fan-driven interactions, such as cosplay, to cultivate a dynamic and engaging atmosphere (Carrillo Vera & Aguado Terrón, 2019). Understanding these unique variables is essential for fostering fan engagement and ensuring the success of offline events.

Research on stadium atmosphere has predominantly focused on traditional sports, raising questions about the relevance of these factors in the context of esports. Despite the growing significance of esports, there is a notable scarcity of research examining stadium atmosphere in this domain. To address this gap, the objective of this study was to develop a scale specifically tailored to measure stadium atmosphere within esports events. The study drew on existing literature, concepts, and definitions of stadium atmosphere from traditional sports, grounding its framework in Mehrabian and Russell's (1974) environmental psychology theory and the stimulus-response paradigm as its theoretical foundation. By identifying and optimizing the key factors that create a positive and immersive atmosphere, organizers can attract larger audiences to physical venues, increasing the frequency of offline tournaments and expanding the esports market. The study was conducted in three phases: (1) generating and refining potential items, (2) purifying the scale, and (3) validating the scale. The results will provide valuable guidance for developing marketing strategies, optimizing venue operations, and enhancing overall spectator experience, which will be further discussed.

## **Research Methodology**

In line with the methodology outlined by Churchill (1979), a systematic process was followed to develop a measurement scale. Utilizing a mixed methodology, the initial phase involved a qualitative study, during which potential items were generated based on a thorough review of relevant literature and existing scales. This was supplemented by in-depth interviews, and the items were subsequently refined by a panel of experts to ensure their relevance, appropriateness, and generalizability. Following the qualitative phase, a quantitative study was conducted in two stages. The first stage, referred to as the scale purification process (quantitative survey 1), aimed to identify and develop the potential dimensions of the scale. The second stage, the scale validation process (quantitative survey 2), was conducted to ensure the reliability and validity of the scale. These three steps - qualitative item generation, scale purification, and scale validation - were carried out to develop a robust scale for measuring the Esports Stadium Atmosphere (ESSA) construct.

### **Step I: Potential item generation and refinement (a qualitative study)**

#### **Qualitative Study: Participants, Instrument, and Data Collection**

This step utilized a qualitative approach to investigate the dimensions of esports stadium atmosphere, building on a comprehensive review of existing literature and validated measures of stadium atmosphere in traditional sports contexts (e.g., football, basketball, baseball, and various other sports). Potential items were adapted from several prior studies, including Balaji & Chakraborti (2015), Soygüden et al. (2019), Uhrich and Benkenstein (2010). Certain items were modified to better fit the context of esports.

Subsequently, semi-structured in-depth interviews were conducted with 20 key informants, including 8 esports fans, 6 professional or semi-professional esports players, 3 experienced esports casters, and 3 event organizers. All participants had attended professional offline esports events at least three times. Informants were chosen for their direct experience and varying responsibilities within the esports ecosystem, providing diverse insights into the stadium atmosphere. A non-probability purposive sampling method was used, and participants were recruited through personal networks and snowball sampling techniques. The interviews, which lasted approximately 45 minutes to an hour, were conducted online via Microsoft Teams and Discord application. A semi-structured format was employed to gather participants' insights on the atmosphere of live esports events and the factors shaping that atmosphere in offline esports venues.

The interview questions concentrated on two key areas: (1) What factors affect the atmosphere at esports competition events during pre- and post-game entertainment, as well as in engaging fan zone activities located at the front of the venue before and after the competition? and (2) What factors influence the atmosphere during and after the esports gaming competition within the competition hall or venue? All interview transcripts were analyzed through text analysis, coding, and keyword searches to identify recurring themes and factors that shape the esports stadium's atmosphere.

#### **Face Validation**

The potential items generated from the literature review and in-depth interviews underwent a face validity assessment by a panel of five experts from the esports industry. These experts included academics specializing

in esports and gaming, sport marketing and management, event management, and sport science. The purpose of this assessment was to validate the items for the subsequent study. According to McKenzie et al. (1999), consulting at least five experts is sufficient for obtaining expert opinions in scale content validity studies. Face validity is a widely recognized method for item development and modification, as noted by Churchill (1979).

The expert panel evaluated the face validity of the items, with the goal of eliminating redundancies, selecting the most appropriate items for the scale. Items deemed less relevant to the esports context were removed. Following this process, the remaining items were refined to ensure clarity and relevance (Hardesty & Bearden, 2004), with careful attention given to their applicability within the unique atmosphere of esports competitions. This refinement process was crucial to maintaining the integrity and contextual appropriateness of the scale. As a result of these procedures, a refined set of 81 items related to the esports stadium atmosphere was retained for further investigation.

## **Step II: Scale Purification Study (Quantitative Survey 1)**

Purification studies are used to evaluate and refine the dimensionality of scale items, enhancing a scale's reliability and validity by identifying and removing problematic items (Churchill, 1979). This process typically involves two phases: Exploratory Factor Analysis (EFA) to reveal underlying factors and initial reliability estimates, followed by Confirmatory Factor Analysis (CFA) to validate the structure (Hair et al., 2008). By refining the scale, researchers ensure that it accurately represents the constructs being measured.

### **Quantitative Study: Participants, Instrument, and Data Collection**

In the second step of the research, data were collected using purposive and convenience sampling methods. The participants were individuals with experience attending at least one professional international offline esports event organized in Thailand between 2017 and 2021 (prior to the COVID-19 pandemic e.g., The Thailand Esports Overwatch World Cup Qualifiers 2018, MET Asia Series: PUBG Classic 2019, The 2019 Arena of Valor International Championship). To ensure participants met the eligibility criteria, they were required to select the esports tournaments they had attended from a list of events provided. A total of 224 responses were initially collected; however, 24 responses were excluded due to participants either not having attended an international esports event or for providing incomplete information. This left 200 valid responses, which met the recommended minimum sample size of 200 for factor analysis (Weston & Gore, 2006). According to measurement development guidelines, a sample size between 200-300 respondents is typically sufficient for most scale development processes (Clark & Watson, 1995; DeVellis, 1991). Data were collected through an online Google Forms questionnaire distributed via social media platforms, including Facebook (esports community fan pages and Messenger) and Line chat applications. The questionnaire employed a five-point Likert scale (5 = strongly agree, 1 = strongly disagree), which is commonly used in online and self-administered surveys (Hair et al., 2008). The items developed in Study I were assessed to evaluate the factors influencing esports stadium atmosphere.

The demographic profile of the respondents was as follows: the majority were male (61.5%), aged between 20-30 years (81.5%), and held at least a bachelor's degree or equivalent (56%). Most of the participants were students (47.5%), with an average monthly income of 10,000 and 20,000 Thai Baht (47%). In terms of esports genre preferences, 45% of the respondents favored shooting games, and 44.5% reported playing online esports games every day. On average, participants spent 2-3 hours (29%) per day playing esports games.

### **Data Analysis**

Descriptive statistics were computed using SPSS Statistics 22. EFA was conducted using AMOS 26 to identify the underlying dimensions of the item scales. Following this, CFA was performed to validate the factor structure and ensure the robustness of the measurement model (Hair et al., 2008).

EFA was employed to assess the dimensionality of the scale, utilizing principal component analysis (PCA) along with varimax rotation to simplify the factor structure. Varimax rotation, a commonly used orthogonal rotation method, aims to maximize the variance of factor loadings across variables, thereby enhancing interpretability (Hair et al., 2008). The selection of factors was guided by the criterion that the eigenvalue of each factor must exceed 1, which ensures that the selected components explain a significant portion of variance within the data (Kaiser, 1960). The process of scale refinement relied on factor loadings and item-to-total correlations to identify and remove weak or cross-loaded items. Items were excluded if they cross-loaded at greater than 0.4 on multiple factors, as this indicates poor discriminant validity (Tabachnick & Fidell, 2007). Additionally, items with factor loadings below 0.6 were removed to ensure that the retained items contributed significantly to the factor structure. The threshold of 0.6 was chosen based on established recommendations for sufficient factor loading in social science research (Hair et al., 2008). Furthermore, to maintain the robustness of the factor structure, each component or factor was required to have at least three strongly loading variables, ensuring the stability of the dimensions identified through the analysis (Fabrigar & Wegener, 2012). Through this method, the EFA helped refine the ESSA scale, ensuring that only items with strong loadings and clear differentiation between factors were retained for further validation. The rigorous application of these criteria enabled the identification of a factor structure that adequately captures the key dimensions of the esports stadium atmosphere.

Next, CFA is used to validate the factor structure identified in EFA and ensure items represent their latent variables (Hair et al., 2008). Fit indices commonly used in CFA include Chi-square ( $\chi^2$ ), Normed Chi-Square ( $\chi^2/df$ ) where value  $\leq 3$  indicates an acceptable fit (Marsh & Hocevar, 1985). GFI, AGFI, and NFI values greater than 0.90 suggest a good model fit (Bentler & Bonett, 1980; Jöreskog & Sörbom, 1981; Tanaka & Huba, 1985). Additionally, an RMSEA value below 0.06 and an SRMR value below 0.08, along with CFI and TLI (NNFI) values  $\geq 0.95$ , represent a strong model fit (Hu & Bentler, 1999). These indices collectively provide a robust framework for assessing the adequacy of the model in CFA, ensuring that the specified structure aligns with the collected data and provides a solid foundation for further analysis.

To establish the validity of the measurement model, both convergent and discriminant validity tests were applied following the approach outlined by Fornell and Larcker (1981). Convergent validity was assessed by calculating the average variance extracted (AVE) and the composite reliability (CR) of each construct. According to Fornell and Larcker (1981), AVE values greater than 0.50 indicate that a construct explains more than half of the variance of its indicators, thereby confirming convergent validity. Additionally, CR values greater than 0.70 suggest adequate internal consistency of the constructs. As per Fornell and Larcker's (1981) criterion, discriminant validity is established when the AVE for each construct is greater than the squared correlations between that construct and others, indicating that the constructs are sufficiently distinct from one another.

### **Step III: Scale Validation Study (Quantitative Survey 2)**

#### **Quantitative Study: Participants, Instrument, and Data Collection**

The final phase of the research involved a convenience sample of 340 respondents who participated in professional international offline esports tournaments held in Thailand after 2022, following the COVID-19 pandemic e.g., PUBG NATIONS CUP 2022 (PNC 2022). Data were gathered using simple random sampling methods through an online survey featuring a five-point Likert scale questionnaire, which was designed based on the findings from Step II and distributed across social media platforms, including Facebook (esports community fan pages and Messenger) and Line chat applications.

The demographic characteristics of the respondents indicated that the majority were male (55.9%), with 86.5% of participants aged between 20 and 30 years. A significant portion of the respondents held at least a bachelor's degree or its equivalent (55.3%), and 52.4% were students. In terms of income, 51.2% of the respondents reported earning between 10,000 and 20,000 Thai Baht per month. Regarding esports genre preferences, most respondents favored shooting games such as *Counter Strike* and *Overwatch*. Additionally, 41.5% of participants reported playing online esports games daily, while 33.5% played 3-4 days per week. The average time spent playing online esports games was 2-3 hours per day (27.1%), followed by 1-2 hours per day (26.5%). The sample, largely composed of young males aged 20-30, is consistent with past literature, which indicates that younger generations are more inclined to attend live sporting events in stadiums.

#### **Data Analysis**

The primary objective of Step III was to validate the findings of Step II and assess the applicability of the Esports Stadium Atmosphere (ESSA) scale to a broader population. To achieve this, CFA was employed to verify the factor structure identified in the previous study (Hair et al., 2008). This method is essential for evaluating the dimensionality, reliability, and validity of the scale. Specifically, the reliability of the scale was assessed through composite reliability (CR), while validity was examined using both convergent and discriminant validity. CFA is particularly valuable because it enables researchers to validate the internal structure of a scale and to establish whether the identified factors are consistent across different samples and contexts (Byrne, 2010). This rigorous process ensures that the ESSA scale is both reliable and valid for use in future studies and practical applications within the esports context.

## **Results**

### **Results of step I: Qualitative research for item generation and refinement**

The literature review focused on existing validated measures of stadium atmosphere and its various dimensions. From this, 63 potential items were identified, pertaining to the atmosphere and environment in both traditional sports and esports contexts, with certain items being modified to better fit the esports setting.

Following the literature review, data were collected through semi-structured in-depth interviews with key informants. Independent coding of transcribed responses revealed 81 indicators related to the atmosphere or environment in offline esports event venues. Notably, several factors influencing the esports event atmosphere differed from those identified in traditional sports literature. For instance, elements such as player station design, graphic design on large broadcast screens, player introduction and presentation, special effects on stage, in-game related shows, cosplay contests, selling of gaming merchandise, limited edition in-game skins or items, and activities in pre- and post-game side event areas and fan zone entertainment were highlighted in the esports setting.

In the final stage, the researchers consolidated the items generated from the two qualitative studies and removed redundant items, resulting in a pool of 96 items. These items were subsequently evaluated by expert judges to assess their relevance and generalizability. A panel of experts then conducted a face validity assessment to ensure that the remaining items were appropriate for the context of esports competitions. This process involved rewording several items to better align with the esports context. As a result, 15 items - relating to professional umpires, coach's behavior, promotional models, pre-final match concerts, seating slope, game bugs, mobile charging stations, loud and continuous chanting, fans performing set choreography, cheer leaders' performances, songs and club anthems, players interaction with spectators, teams' win/loss records, emergency services, and teams' traditions - were deemed inappropriate in esports context and eliminated. The remaining 81 items demonstrated acceptable content and face validity and will be utilized in a factor analysis for further scale purification.

### Results of step II: Quantitative research for scale purification

The primary objective of the second step was to test reliability and identify the preliminary factor structure of the ESSA scale using EFA. During the analysis, items with low factor loadings (below 0.40) or those with loadings above 0.40 on multiple factors (indicating complexity) were removed. The data showed no significant cross-loadings (below 0.40), and strong reliability was observed with a Cronbach's alpha of  $\geq 0.70$  (Hair et al., 2008). Due to factor loadings below 0.60 (Hair et al., 2008), fifty-two items were excluded from further analysis. The EFA results revealed a six-factor structure, consisting of 29 items with eigenvalues greater than 1. Factor loadings ranged from 0.602 to 0.794, with internal consistency values ( $\alpha$ ) between 0.754 and 0.926, meeting the established threshold for acceptability (see Table 1). These results indicated that the data were suitable for subsequent confirmatory factor analysis.

Subsequently, CFA was conducted using the original dataset to confirm the factor structure derived from the EFA phase, which consisted of six factors and 29 items. To assess convergent validity, item-factor loadings, construct reliability (CR), and average variance extracted (AVE) were examined (Hair et al., 2008). As presented in Table 2, all factor loadings surpassed the recommended threshold of 0.50 (Hair et al., 2008), ranging from 0.536 to 0.905. The composite reliability ranged from 0.761 for the "Pre-game side events and fan zone entertainment" factor to 0.889 for the "Spectators' behavior and engagement" factor, indicating a high level of internal consistency. All coefficients exceeded the recommended threshold of 0.70 (Hair et al., 2008), confirming the reliability of the scale dimensions.

**Table 1** Exploratory Factor Analysis of Esports Stadium Atmosphere

Component	Factor loading	Cronbach's alpha coefficient ( $\alpha$ )	Eigen values	% of Variances
Component 1		0.926	28.749	35.493
ESSA 18	0.621			
ESSA 21	0.679			
ESSA 25	0.794			
ESSA 28	0.636			
ESSA 31	0.748			
ESSA 34	0.730			
Component 2		0.865	5.125	6.327
ESSA 3	0.743			
ESSA 4	0.700			
ESSA 6	0.717			
ESSA 8	0.655			
ESSA 9	0.740			
ESSA 10	0.669			
Component 3		0.878	4.557	5.625
ESSA 72	0.602			
ESSA 73	0.613			
ESSA 74	0.736			
ESSA 75	0.758			
ESSA 76	0.671			
Component 4		0.830	2.806	3.464
ESSA 53	0.610			
ESSA 55	0.658			
ESSA 57	0.705			
ESSA 59	0.754			
Component 5		0.827	2.633	3.250

Component	Factor loading	Cronbach's alpha coefficient ( $\alpha$ )	Eigen values	% of Variances
ESSA 42	0.608			
ESSA 44	0.767			
ESSA 45	0.647			
ESSA 46	0.642			
Component 6		0.754	2.320	2.864
ESSA 35	0.727			
ESSA 37	0.634			
ESSA 38	0.615			
ESSA 81	0.603			

Furthermore, the average variance extracted (AVE) for each factor exceeded the recommended value of 0.50, with AVE values ranging from 0.506 to 0.581, supporting convergent validity (Fornell & Larcker, 1981) (see Table 2).

**Table 2** Results of standardized factor loading in Scale Purification Phase ( $\lambda_1$ ), standardized factor loading in Scale Validation Phase ( $\lambda_2$ ), Average Variance Extracted (AVE), and Composite Reliability (CR) from CFA

Esports stadium atmosphere factors and items	$\lambda_1$ (n = 200)	$\lambda_2$ (n = 340)
<b>Factor 1: Spectators' behavior and engagement (SPEC)</b>	AVE = 0.575 CR = 0.889	AVE = 0.534 CR = 0.872
The passion of spectators in the stadium stands is perceived as intense. (ESSA 18)	0.653	0.738
Perceived number of spectators is large in the stadium. (ESSA 21)	0.686	0.616
Spectators become emotionally engaged when players compete or execute strategies during the game in the stadium. (ESSA 25)	0.870	0.648
The behavior of other spectators during the game was appropriate. (ESSA 28)	0.744	0.785
Fans shout and cheer for the names of their favorite esports' teams/players. (ESSA 31)	0.807	0.849
Arranging seating for spectators to group supporters of the same side in a designated area enhances the enjoyment of the atmosphere. (ESSA 34)	0.770	0.724
<b>Factor 2: Event and player attractiveness (EVPL)</b>	AVE = 0.526 CR = 0.869	AVE = 0.649 CR = 0.917
This tournament is regarded as an important event that attracts the interest of spectators. (ESSA 3)	0.648	0.705
The teams participating in the tournament were highly reputable, skilled, and evenly matched, making the competition intense and engaging. (ESSA 4)	0.784	0.735
The tournament features a diverse lineup of competitors from various nations, enhancing the excitement of the competition. (ESSA 6)	0.675	0.878
The presence of teams with exceptional skills enhances the tournament's appeal. (ESSA 8)	0.741	0.795
The involvement of renowned players from around the world adds excitement and enjoyment to the game. (ESSA 9)	0.809	0.844
The skills and playing techniques of the players are excellent. (ESSA 10)	0.680	0.864
<b>Factor 3: Facility quality (FAC)</b>	AVE = 0.581 CR = 0.874	AVE = 0.530 CR = 0.780
The arrangement of spectator seating and the competition stage is positioned at an appropriate distance. (ESSA 72)	0.725	e
The signs (e.g. exit gates, toilets, parking, seating position) in the venue are adequate. (ESSA 73)	0.721	e
The venue is spacious and comfortable. (ESSA 74)	0.766	e
Facilities at the venue are adequate and easily accessible. (ESSA 75)	0.744	0.656
The quality of the facility in the venue is great. (ESSA 76)	0.849	0.560
<b>Factor 4: Stage devices (STAG)</b>	AVE = 0.506 CR = 0.754	AVE = 0.521 CR = 0.766
The configuration of the championship trophy stands is outstanding. (ESSA 53)	0.905	e
Large broadcast screens (large LED screens) are well positioned for optimal visibility and offer high-definition visuals. (ESSA 55)	0.538	0.543

<b>Esports stadium atmosphere factors and items</b>	<b><math>\lambda 1</math> (n = 200)</b>	<b><math>\lambda 2</math> (n = 340)</b>
The lighting, sound, and special effects in the hall are superb and breathtaking. (ESSA 57)	0.590	0.710
The pre-competition player introductions presented on the large screen were fascinating. (ESSA 59)	0.574	e
<b>Factor 5: In-game related items and merchandise (ITEM)</b>	AVE = 0.545 CR = 0.827	AVE = 0.505 CR = 0.726
The attire of event booth staff is thoughtfully chosen to align with in-game content or characters, enhancing the event's visual appeal. (ESSA 42)	0.701	e
In-game related giveaways or memorabilia are exclusive to this event. (ESSA 44)	0.759	0.635
The distribution of event-specific skins or items during the event is highly appealing. (ESSA 45)	0.754	0.761
The sale of gaming merchandise through reputable and authorized dealer booths is extremely attractive. (ESSA 46)	0.739	0.656
<b>Factor 6: Pre-game side events and fan zone entertainment (PRE_EN)</b>	AVE = 0.507 CR = 0.761	AVE = 0.649 CR = 0.775
A variety of in-game-related activities in the pre-game side events and fan zone entertainment are engaging and interesting. (ESSA 35)	0.710	0.572
Opportunities are available to participate in activities and interact with renowned esports influencers, streamers, and professional players. (ESSA 37)	0.654	e
Collaborative activities among attendees in the fan zone create an enjoyable atmosphere during the event. (ESSA 38)	0.754	0.986
The temperature in the venue is suitable and comfortable. (ESSA 81)	0.536	e

Note: e = Items eliminated following the confirmatory factor analysis of Study 2 data.

The discriminant validity of the measures was evaluated following the guidelines of Fornell and Larcker (1981), where the square root of the AVE for each construct should exceed the correlations between that construct and any other construct within the model. The results confirmed that the discriminant validity criteria were met (see Table 3). Finally, the model fit indices for the measurement model involving the 29 items were evaluated against thresholds established in previous studies. The fit indices indicated an excellent model fit, with values as follows: goodness of fit index (GFI = 0.931), comparative fit index (CFI = 0.987), adjusted goodness of fit index (AGFI = 0.905), root mean square error of approximation (RMSEA = 0.029), normed fit index (NFI = 0.922), Tucker-Lewis index (TLI = 0.980), and standardized root mean square residual (SRMR = 0.043) (Hu & Bentler, 1999). The CFA results confirm that the six-factor structure of the esports stadium atmosphere is consistent, with all items significantly contributing to the overall construct of esports stadium atmosphere.

**Table 3** Discriminant Validity for esports Stadium Atmosphere Construct (n=200)

<b>Construct</b>	<b>SPEC</b>	<b>EVPL</b>	<b>FAC</b>	<b>STAG</b>	<b>ITEM</b>	<b>PRE_EN</b>
<b>SPEC</b>	<b>0.758<sup>a</sup></b>					
<b>EVPL</b>	0.483	<b>0.725<sup>a</sup></b>				
<b>FAC</b>	0.513	0.515	<b>0.763<sup>a</sup></b>			
<b>STAG</b>	0.614	0.370	0.484	<b>0.711<sup>a</sup></b>		
<b>ITEM</b>	0.670	0.436	0.619	0.593	<b>0.739<sup>a</sup></b>	
<b>PRE_EN</b>	0.702	0.493	0.472	0.603	0.576	<b>0.712<sup>a</sup></b>

Note: a = Square root of AVE

### **Result of step III: Quantitative research for scale validation**

Following the scale purification process, a third step was conducted using a different dataset to validate the relationships among the items in the initial scale through CFA. Data were collected via questionnaires focusing on six factors, encompassing 29 items related to the esports stadium atmosphere. The model's overall fit was deemed acceptable based on the cutoff criteria for fit indices proposed by prior literature. The CFI of 0.99 exceeded the recommended threshold of 0.95, and both RMSEA at 0.03 and SRMR at 0.04 were within acceptable ranges. Eight items were identified with factor loadings below 0.50, leading to their elimination from the model. Modifications were made according to the modification indices (MI) until the model aligned with the empirical data. After these adjustments, the measurement model demonstrated a good fit to the data: GFI=0.971, CFI=0.996, AGFI=0.924, RMSEA=0.026, NFI=0.978, TLI=0.989, and SRMR=0.037.

As shown in Table 2, the measurement model constructs were assessed for convergent validity. Factor loadings exceeded 0.50, meeting the criteria outlined by Hair et al. (2008). Additionally, the average variance extracted (AVE) for each ESSA factor was 0.5 or higher, confirming that the AVE values met the appropriate threshold (Fornell & Larcker, 1981). The construct reliability (CR) values also met the minimum required level ( $CR \geq 0.70$ ), further confirming the reliability of the scale dimensions. As indicated in Table 4, the squared correlations were smaller than the corresponding AVE values, confirming that the constructs in the measurement model had adequate discriminant validity (Fornell & Larcker, 1981).

**Table 4** Discriminant Validity for Esports Stadium Atmosphere Construct (n=340)

Construct	SPEC	EVPL	FAC	STAG	ITEM	PRE_EN
SPEC	<b>0.731<sup>a</sup></b>					
EVPL	0.427	<b>0.806<sup>a</sup></b>				
FAC	0.627	0.652	<b>0.728<sup>a</sup></b>			
STAG	0.507	0.790	0.716	<b>0.722<sup>a</sup></b>		
ITEM	0.655	0.358	0.726	0.688	<b>0.711<sup>a</sup></b>	
PRE_EN	0.476	0.469	0.713	0.680	0.537	<b>0.806<sup>a</sup></b>

Note: a = Square root of AVE

In conclusion, the findings confirmed the validity and reliability of the ESSA scale, and the factor structure discovered in Step II was duplicated in Step III. The findings from the cross-validation study provided substantial evidence to confirm the robustness of the ESSA scale. As a result, the esports stadium atmosphere construct consists of six factors: Spectators' behavior and engagement (SPEC) with six items, Event and player attractiveness (EVPL) with six items, Facility quality (FAC) with two items, Stage devices (STAG) with two items, In-game related items and merchandises (ITEM) with three items, and Pre-game side events and fan zone entertainment (PRE\_EN) with two items.

## Discussion

This study aims to investigate the atmosphere of esports stadiums, which is recognized as a key motivator for spectators attending live competitions. Specifically, it explores the concept and various factors that shape the atmosphere within esports venues. Drawing on existing literature and employing a comprehensive mix of qualitative and quantitative methods, the research seeks to develop a reliable measurement scale to capture the core elements of the esports stadium atmosphere. The analysis of factors influencing the esports stadium atmosphere, conducted through EFA and CFA, identified a final construct comprising six factors and 21 items. These factors include (1) spectators' behavior and engagement, (2) event and player attractiveness, (3) facility quality, (4) stage devices, (5) in-game related items and merchandise, and (6) pre-game side events and fan zone entertainment. The findings demonstrate both congruence with and distinctions from prior research on the atmosphere of traditional sports events, which will be elaborated upon in subsequent discussions.

Stadium atmospheres, whether in traditional sports or esports, are defined by their energy, excitement, and the communal experience of spectatorship. Both types of venues are intentionally designed to enhance fan engagement, encourage participation, and elevate the overall experience for players and audiences (Scholz, 2019). Despite these shared objectives, traditional sports and esports exhibit significant differences in the nature of competition, audience expectations, and venue design, resulting in distinct atmospheric characteristics.

This study explores esports stadium atmospheres through the stimulus-organism-response (SOR) model proposed by Mehrabian and Russell (1974), supplemented by related theories to analyze factors influencing spectator experiences. The SOR model explains how environmental stimuli, such as venue design and crowd dynamics, evoke emotional responses that influence behaviors like engagement and loyalty. Additionally, social identity theory (Tajfel & Turner, 1986) highlights the role of shared fan activities, such as chanting and cosplay, in enhancing the communal atmosphere. This integrated approach identifies the unique environmental and social dynamics of esports stadiums, providing insights to enhance fan experiences and venue effectiveness.

From the results of this study, the identified factors align with previous categorizations of stadium atmosphere dimensions. The spectators' behavior and engagement factor corresponds to similar dimensions found in prior studies, such as spectators' behavior (Uhrich & Benkenstein, 2012), spectator passion, and spectators' density. The presence and collective behavior of fans, characterized by their actions, emotional expressions, and noise levels, are central to shaping the event atmosphere, amplifying excitement and engagement. Both traditional sports and esports share elements of collective fan behavior, such as coordinated chants or the wave, which foster a sense of community and shared identity. Chants supporting specific teams or players create a unifying experience for spectators (Hamari & Sjöblom, 2017), a phenomenon explained by social identity theory (Tajfel & Turner, 1986). This theory posits that individuals derive a sense of belonging and pride from associating with a group, such as being a fan of a particular

team, leading to similar crowd dynamics in both sports contexts (Wann et al., 2008). Perceptions of crowd density further enhance the experience, with vibrant audiences intensifying the game's energy, uplifting player morale, and creating an immersive atmosphere for attendees (Wakefield & Blodgett, 2016).

Moreover, emotional engagement of fans is a critical factor. Spectators experience a wide range of emotions - from excitement and joy to anxiety and frustration - depending on their favored team or player's performance (Seo, 2013). Emotional highs, such as celebrating a goal or a significant play, are expressed through collective behaviors like standing ovations or fist-pumping, generating contagious energy that spreads through the crowd. Research shows that active participation in chants and cheers enhances fans' connection to the event, making the experience more fulfilling (Boyle & Magnusson, 2007). The behavior of spectators, whether positive or negative, significantly impacts the event atmosphere. Positive crowd behaviors, such as cheering and coordinated support, heighten the energy and intensity of the game, creating a memorable experience. Conversely, negative actions, such as hostile chants or booing, can diminish the enjoyment and adversely affect players and other spectators. Noise levels, particularly in moments of high tension or critical gameplay, also influence the stadium atmosphere, as fans engage more intensely during these pivotal moments (End et al., 2002). Lastly, seating arrangements and social similarity among fans further enhance the atmosphere. It was found that grouping supporters of the same side in designated areas increases the enjoyment of the event. When spectators are surrounded by like-minded individuals, such as those sharing a gamer identity, gender, or age group, they feel more relaxed and engaged. This sense of similarity strengthens the bond among fans and amplifies the collective experience of the event.

The factor of event and player attractiveness plays a pivotal role in shaping the stadium atmosphere and aligns with dimensions identified in prior studies. Soyguden et al. (2019) emphasized that star players significantly affect the competitive atmosphere in sports events. Similarly, the team competition dimension demonstrates that factors such as rivalry intensity, perceived competitiveness, and the game's importance contribute significantly to the overall atmosphere of a stadium.

Besides, a key determinant of an event's success is its reputation, encompassing the prestige of the tournament, the level of competition, and the quality of production (Scholz, 2019). In esports, the presence of famous teams and star players is a critical attraction for offline events, drawing spectators who often travel specifically to watch their favorite competitors perform live (Seo, 2013). High-profile players and teams act as focal points for fan engagement, creating a heightened sense of excitement and emotional investment. Witnessing renowned competitors face off in a live setting adds to the overall experience, making it more memorable for attendees. The results of this study confirm that event and player attractiveness, including factors such as tournament reputation, the importance of the event, the participation of renowned players and teams, and the diversity of competitors from various nations significantly impacts the stadium atmosphere. The presence of teams and players with exceptional skills not only enhances the competitive appeal but also elevates crowd excitement. Hamari and Sjöblom (2017) similarly noted that well-known players or popular teams amplify crowd enthusiasm, thereby intensifying the overall atmosphere of the event.

As also highlighted by several studies, the facility factor plays a crucial role in shaping the stadium atmosphere. The quality of the facility significantly impacts the overall atmosphere, a finding supported by research on architecture and stadium-induced stimuli (Uhrich & Benkenstein, 2010, 2012;). These studies underscore that well-designed venues not only enhance the physical environment but also contribute to creating an immersive and engaging fan experience. The design and development of dedicated venues for live events, particularly esports, must prioritize elements that foster an engaging and fan-friendly atmosphere. From an ergonomic perspective, Soyguden et al. (2019) emphasized the importance of designing stadiums and their surrounding environments to facilitate ease of use for spectators. When fans can easily navigate the venue and access necessary services, they are more likely to remain engaged with the event rather than becoming distracted or frustrated by logistical challenges (Reitman et al., 2020). Additionally, factors such as comfortable seating, adequate air conditioning, and spacious aisles significantly enhance the audience's experience. These considerations are especially important for esports events, which often extend over several hours or even days. Ensuring the physical comfort of spectators is vital for maintaining their engagement and fostering a positive atmosphere throughout the event.

Pre-game side events and fan zone entertainment are supplementary activities that enhance the overall experience for attendees, whether they are participants, spectators, or casual visitors. These activities aim to entertain, engage, and provide additional value beyond the primary competitive matches. This factor aligns closely with the entertainment dimension which emphasizes the importance of ancillary entertainment in shaping the overall atmosphere of live events. In esports, pre-game entertainment often takes place in designated fan zones or side-event areas outside the main competition venue, offering a wide variety of activities. Pu et al. (2021) noted the growing prevalence of parallel events at esports competitions, including game showcases, cosplay conventions, and live music performances. These activities not only engage attendees but also create a vibrant and immersive environment that complements the main event. Compared to traditional sports, where entertainment often occurs within the stadium during breaks, such as halftime shows or player interactions with spectators, esports events emphasize pre-game activities. These include in-

game related activities and collaborative opportunities among attendees, which enhance the social and visual experience. For example, thematic spaces are often designed for photo opportunities, featuring game-themed sets, green screens for virtual backgrounds, or life-sized replicas of popular in-game characters. These interactive elements provide attendees with memorable experiences while simultaneously generating promotional content for social media, thereby amplifying the event's reach.

The dimensions of "stage devices" and "in-game related items and merchandise" present distinct characteristics unique to the esports context, distinguishing them from the traditional sports setting. This differentiation primarily stems from the nature of the competition itself. In traditional sports, athletes perform physically on a field, creating an immediate and tangible connection between spectators and the competition as they witness the players' physical efforts, athleticism, and emotions firsthand (Wann et al., 2008). By contrast, esports involves digital gameplay projected onto large screens, with players seated at desks or within booths. The experience is mediated through technology, making it more abstract and visually oriented for the audience, as moments of excitement rely heavily on the visual storytelling of the game (Reitman et al., 2020).

The stage device factor encompasses advanced audiovisual systems such as large LED screens, dynamic lighting, surround sound, and special effects, which are critical in creating an immersive esports atmosphere. Similar to the electronic device quality dimension identified in traditional sports, these technologies play an even more prominent role in esports. As noted by Seo (2013) and Hamari & Sjöblom (2017), esports events utilize cutting-edge audiovisual tools, including high-definition LED screens, virtual reality (VR), and augmented reality (AR), to amplify the spectator experience. These elements enable immersive storytelling, where synchronized lighting, sound effects, and graphic overlays heighten the impact of in-game moments, such as a dramatic comeback or a skillful play. A well-designed stage serves as the focal point of the action. Large screens strategically placed around the venue ensure that all attendees, regardless of their seating location, have clear visibility of the gameplay (Scholz, 2019). These screens not only display the live gameplay but also provide supplementary information such as player statistics, live commentary, and team standings, enhancing the audience's understanding and engagement (Seo, 2013). Sound systems are another crucial component of the esports atmosphere. From in-game sound effects to commentators' voices and crowd reactions, clear and synchronized audio enhances the immersive experience. High-quality surround sound can amplify the intensity of pivotal moments, such as last-minute victories or unexpected comebacks, driving emotional engagement among spectators (Seo, 2013; Taylor, 2016). Conversely, technical issues such as audio delays or distortions can disrupt the audience's immersion, negatively impacting their experience.

Moreover, special effects, such as stage pyrotechnics, dynamic lighting, and synchronized soundscapes, further enhance the excitement and elevate the event atmosphere (Hamari & Sjöblom, 2017). These elements contribute to creating an energy-filled environment that heightens audience reactions and makes the event more memorable. Pu et al. (2021) observed that esports events increasingly incorporate dramatic lighting, large broadcast screens, and sophisticated sound systems, establishing a visually and aurally immersive setting for spectators.

The in-game related items and the merchandise factor represent another unique dimension in esports, differing significantly from traditional sports. Esports venues often feature merchandise stores and thematic displays that resonate with the gaming culture, such as life-sized replicas of in-game characters, green screens for virtual backdrops, and collectible in-game items. These elements offer interactive and visually engaging experiences, creating opportunities for fans to connect with their favorite games and players while also generating promotional content for social media (Hamari & Sjöblom, 2017). Esports events frequently feature booths where attendees can purchase team merchandise, gaming gear, and other related products. These booths often include exclusive, event-only items, such as limited-edition jerseys or autographed memorabilia, which appeal to collectors and superfans. According to Seo (2013), merchandise not only strengthens the emotional bond between fans and their favorite teams but also allows fans to publicly display their support through branded accessories or apparel. Furthermore, raffles and giveaways are common features at esports events, often organized by sponsors to keep fans engaged during downtime between matches. These activities add an extra layer of excitement and provide fans with opportunities to win prizes such as gaming gear, team merchandise, or event-related memorabilia. Random giveaways throughout the event help maintain audience interest and create positive associations with the event sponsors. This integration fosters deeper fan engagement, as attendees can continue interacting with the event long after it has concluded. Taylor (2016) observed that such in-game items extend the lifespan of an event's impact by allowing fans to carry their experience into the digital realm.

Another noteworthy finding is that fan demographics and behavior differ significantly between traditional sports and esports, resulting in variations in stadium atmosphere. Descriptive analysis of demographic data from offline esports event attendees in this study revealed that the majority of participants are male (55.9%), with 86.5% aged between 20 and 30 years. This younger demographic is typically more technologically savvy and actively engages with the event through mobile devices, social media, and live-streaming apps while attending in person (Scholz, 2019). Such digital engagement creates a dual-layered atmosphere, where spectators react not only to the live event but also to online communities, sharing real-time reactions, participating in polls, and discussing event highlights (Seo, 2013). In

traditional sports, while digital engagement is gradually increasing, the atmosphere remains primarily driven by physical presence and direct vocal expressions. Crowd behavior is characterized by traditional elements such as chants, cheers, and coordinated movements like the wave, which serve as the main contributors to the atmosphere (Wann et al., 2008). In contrast, esports crowds exhibit unique behaviors reflective of their digital-native background. These include “meme cheers” and chants inspired by online culture, which add a distinctive cultural dimension to the event (Hamari & Sjöblom, 2017).

## **Suggestions**

The Esports Stadium Atmosphere (ESSA) plays a crucial role in attracting fans to offline events, offering a unique and engaging experience distinct from online viewing. As noted by Balaji and Chakraborti (2015), stadium managers can enhance spectator attendance and satisfaction by focusing on factors that shape a positive atmosphere, such as immersive engagement and suitable facilities. For esports event organizers, live fan participation provides significant revenue opportunities through sponsorships and ticket sales. Despite its importance, research on stadium atmosphere in the context of esports remains limited. Developing a robust scale to measure ESSA significantly advances understanding of esports spectator behavior at offline events, offering valuable insights for marketing research. Furthermore, factors unique to esports, such as digital interactivity and fan engagement practices, contribute to broader knowledge on event organization and may have implications for traditional sports contexts. Esports organizers, marketers, and management professionals must consider the impact of stadium atmosphere when designing marketing strategies as regards the following suggestions.

### **1) Enhancing Spectators' Behavior, Passion, and Cheering**

Organizers should prioritize strategies to boost spectators' behavior, passion, and cheering at offline events. Unified chants, fan recognition through shout-outs or fan cams, and encouragement of positive and respectful behavior can foster a vibrant atmosphere. Interactive fan zones, cheering prompts, and tools like noisemakers amplify crowd energy, while fan-led activities and engaging halftime performances ensure the excitement is maintained throughout the event.

### **2) Optimizing Stage Design and Devices**

The stage is the centerpiece of action and should be both functional and visually appealing. Organizers should ensure balanced seating and integrate immersive elements like lighting, sound, and special effects to enhance the atmosphere. A large, high-quality LED screen is essential for displaying clear visuals, such as player introductions, scores, game highlights, and winning moments, helping spectators fully engage with the event.

### **3) Importance of Facility Factors**

Understanding the impact of facility factors is crucial for creating venues that optimize the live esports viewing experience. Organizers should select venues with well-designed layouts, comprehensive facilities, and easy accessibility. Venues should support planned attendee capacity and provide high-quality facilities to deliver a memorable experience for players, spectators, sponsors, and media.

### **4) Pre-Game Side Events and Fan Zones**

Pre-game activities and fan zones are vital for creating a captivating experience from the moment attendees arrive. Organizers can host engaging activities such as meet-and-greets with influencers and players, live performances on small stages, and interactive zones. These efforts leave a lasting impression, positively influencing attendees' emotions and behavioral intentions while enriching their overall experience.

### **5) Merchandise and In-Game Items**

Esports organizers should offer limited-edition merchandise and event-specific in-game items as key revenue streams while fostering fan engagement. Exclusive jerseys, collectibles, and event-themed cosmetics create excitement and deepen fans' connections with teams and games. Strategies like time-limited availability, autographed editions, and proceeds supporting prize pools or teams enhance their appeal, while promoting these items through interactive displays and digital pre-sales ensures a wide reach.

### **6) Leveraging Sponsorships Opportunities through Famous Players and Teams**

Famous players and teams attract lucrative sponsorships, as brands capitalize on their popularity to engage esports audiences (Scholz, 2019). Sponsors can increase visibility through branded jerseys, peripherals, and merchandise, strategically placed across event facilities, media coverage, and fan zones. Interactive installations, product showcases, and digital integrations during live-streamed matches amplify exposure. The ESSA scale can guide sponsorships by identifying opportunities for audience connection and sales, fostering mutually beneficial collaborations.

### **7) Demographic Considerations**

Demographic analysis shows that most attendees are students. Events should be scheduled during holidays, weekends, or evenings on weekdays to align with their availability. Venues should be easily accessible via public

transportation and offer amenities like shopping and dining for parents accompanying younger attendees, ensuring a convenient and enjoyable experience for all participants.

### Limitations and Future Research

Firstly, the generalizability of the ESSA scale is a limitation, as this study focuses on esports spectators at an international tournament in Thailand. Future research should explore factors influencing stadium atmosphere across diverse cultural contexts, as practices in spectatorship, cheering, and emotional expressions differ globally. For example, countries like China and South Korea, with rapidly growing esports scenes, may exhibit distinct dynamics compared to Europe and North America. Understanding these cultural differences would refine the ESSA scale and enhance its applicability to global esports audiences.

Secondly, a comprehensive understanding of how different esports game genres (e.g., multiplayer online battle arenas (MOBAs), first-person shooters (FPS), real-time strategy (RTS), and sports simulation games) and varied stadium contexts (e.g., esports-specific vs. non-specific venues) influence stadium atmosphere remains incomplete. Future research should apply the findings and measurement instrument from this study across these diverse genres and settings to validate its universality. This would provide valuable insights into genre-specific and venue-specific dynamics, helping optimize fan engagement and satisfaction in different esports contexts.

Lastly, future research should explore the broader consequences of stadium atmosphere to develop a more comprehensive understanding of its impacts. While existing studies have largely centered on fan engagement, satisfaction, and loyalty, future investigations could examine how stadium atmosphere affects outcomes such as attendees' mental well-being, social cohesion, and the development of community identity.

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#### Author

Anan & Sukpatch

#### Email

[kritfidetch.anan@gmail.com](mailto:kritfidetch.anan@gmail.com)