



Parameters To Be Considered To Enhance User Experience In A Stadium

¹ Karthi. P, ² Dr. Deepika Raina,

¹Student, ²Associate Professor,

¹Faculty of Architecture,

¹PES University, Bengaluru, India

Abstract: This research paper provides an overview of several architectural elements that affect the overall stadium experience, including seating, façade, and acoustics. The purpose of this paper is to comprehend the effects of different circumstances that viewers encounter. It examines the flow of people and their interactions with onlookers. It is aware of the demands of a sporting event in terms of seating arrangements, façade treatments, acoustics, and cutting-edge technology like videoboards. Its main goal is to examine the user's journey, which takes place on several levels as they move from the stadium's perimeter to its interior. This research methodology is founded on questionnaire-based qualitative research and literature reviews.

Index Terms - Façade treatment, sensory experience, comfort level, stadium design, social interaction, video board, Signages, Fan experience.

I. INTRODUCTION

Stadiums have occupied a unique position within the urban landscape. More than simply dedicated sports arenas, these large, open-air venues are often distinguished by tiers of seating meticulously constructed around a central space. This design allows them to accommodate a multitude of activities, from sporting events that draw passionate fans to large-scale concerts and public gatherings. Notably, stadiums have transcended their utilitarian function to become significant civic infrastructure. They serve as powerful symbols, embodying the spirit and aspirations of the communities they represent within the urban fabric. Stadiums are essential venues for sports and entertainment events, and the user experience is critical to the success of these venues. A positive user experience can lead to increased attendance, revenue, and overall satisfaction for both the stadium and its visitors.

However, creating an optimal user experience in a stadium is a complex task that requires careful consideration of various parameters. This research aims at providing key parameters that must be taken into account to enhance the user experience in a stadium. These large & open-air venues as a construction type are inextricably linked to the society of its existence. Stadiums transcend their function as sporting venues, evolving into potent symbols of the city they reside within. These structures serve as a physical representation of the surrounding community's culture and prevailing viewpoints.

These venues act as the focal point of the celebration throughout the city. It is the location where supporters go to rejoice in victories and grieve defeats. The stadium is the city's most urban building today. However, the stadium is more than a sports venue, it is an instrument for city revitalization.

Stadium plays an important role in social interaction and in bringing unity among the large set of people and it is also a place where the people come for enjoyment and to celebrate sporting events while bringing unity among the community and the nation, therefore, designing the ideal user experience is essential to meeting

the audience's evolving needs in every aspect. In order to give fans, the best possible experience, the stadium needs to be both secure and cozy while also meeting their most specific needs.

The user journey—which starts at home and continues throughout the journey to the stadium, ticket purchasing, finding one's way to a designated seat—as well as the stadium's general atmosphere—which includes boisterous grandstand cheers, which may indicate better acoustics—will be examined in this study. The main parameters this study focus on is the sensory and visual experience from the seating and also the impact of façade design of the stadium on the spectators;

The comfort of seating and the views and angle from the seating; The location, shape and the size of the video board which provides game action, statistics and the interactive updates which gives dynamic experience to the spectators;

Indoor lighting planning and ambience of the stadium; Also, how the design of the path helps the user navigate through the multiple ways to their seats and how the wayfinding system helps users to navigate through the different paths.

II. LITERATURE STUDY

The areas that have profited from improved accessibility provided by the stadium's most recent services and technologies. Facilities designed as a whole help with management, surveillance, emergency services, and catering.

Because premium seating is expensive, customers may not accept anything less than excellent service, so premium seats that are too far from dining areas may cause service issues. Accessibility must therefore consider every facet of operational management. Ensuring that attendees are using the accurate map to locate their seats, facilities, and other features. {1}

Evaluating an event attendee's total "experience," which includes not only interactions, behavior, and acts within the stadium, has revealed ways to improve a fan's experience. {1}

It can be subdivided into three distinct spectator-focused initiatives that aim to improve efficiency, safety, and audience interaction through sport. {2} Knowledge of how large crowds of people act at a stadium can contribute to everyone's safety and security. {2} A smartphone app that provides information on restroom and snack stand wait times. With the use of such technology, fans will be able to watch and enjoy the game for longer periods of time without having to stand in long lines. A computer vision approach can be used to count the people in line. {2}

As fans approach the stadium, the videoboard will welcome them and provide them with interactive updates, game action, and statistics to ensure they have the finest viewing angles and a dynamic experience. {3}

Modern ticketing technology protects attendees and gets rid of fraud and illegal ticket resale. These are just a few of the ways stadiums are embracing digital to improve the experience for performers, fans, and staff. The process of purchasing tickets has been simplified by including links and QR codes with credentials to give guests all the information they need for a successful visit to the stadium.

The wayfinding technology helps spectators to locate a parking lot, restroom, snack stand, and other locations to avoid wasting time and also helps spectators to navigate through the stadium. {4}

Accessible Seating in Stadiums and Arenas provides valuable insights into user experience within stadiums, particularly for users with disabilities. {6} Accessible seating is a crucial factor for a positive user experience which highlights the need for Sufficient number and appropriate size of wheelchair spaces, Companion seating for people with disabilities, Dispersal of accessible seating throughout the stadium, Integration of accessible seating with regular seating for a sense of inclusion, Unobstructed sightlines over standing spectators {6}. The Author {6} also mentions the importance beyond accessibility, elevating the factors such as, sightlines, comfort, Amenities, Signage and Wayfinding. While accessibility is a key aspect of user experience, these parameters tend to explore broader user experience {6}.

Author {7} explores how stadium design can integrate with the surrounding community. This Author {7}, describes innovative video projections on facades, blurring the lines between the stadium and the public realm. The author {7} also explores "permeability," achieved by using transparent materials and lighting to create connections between the stadium interior and exterior, fostering community interaction.

Façade Porosity and Airflow: highlights the crucial role of façade porosity, defined as the ratio of open area to total façade surface, in influencing airflow patterns within a stadium. This concept is particularly relevant when considering spectator thermal comfort. {8} This review {8} examines the impact of façade porosity on airflow within stadium bowls. This research paper {8} can be used to calculate comfort indices associated with specific design options, ensuring these options adhere to wind and thermal comfort requirements. Ultimately, this approach facilitates the selection of the most appropriate architectural solution for a particular stadium project.

Spectators within a stadium encounter the prevailing climatic conditions, which may be partially mitigated by architectural elements such as a roof providing shade or walls offering wind protection. These features, while offering a degree of environmental control, do not entirely eliminate the influence of the external climate. {9} This Author {9} sets an example of Stadium Saint Nicola, designed by Renzo Piano, comprising a terrace for spectators that splits vertically to segregate supporters for security reasons and to increase air movement. {9}. The study {9} concentrated on the impact of architectural characteristics, namely the porosity of the façade, which has demonstrated a tendency to increase airflow. The investigation of stadium designs with varying façade porosity rates has been conducted to examine the impact of altering a specific architectural element on the airflow characteristics of the spectator terrace. {9}

Stadiums that can be opened or closed in response to the weather to improve spectator comfort, including ones with enormous roofs that cover the stands. {10} The façade is a component that has both city and structural virtue. Author {10} defines the façade as “the transition zone between the subjective and the public spaces”, that is, an interface. This perspective emphasizes the importance of façades as the architectural feature that allows city dwellers to engage with the building. {10}.

The stadium's architectural style and design, along with other factors like the exterior setting, interior design, scoreboards, facility maintenance and cleanliness, and décor, all contribute to the overall aesthetics of the venue. {11} It encompasses the aspects that affect spectators' experience of the stadium environment, whether directly or indirectly, such as colour, lighting, fragrance, ventilation, noise, temperature, and music {11}. According to Author {11}, there is an attribution impact associated with facility aesthetics. The architectural style and décor provide a first impression of the stadium, which in turn determines the quality expectations, enjoyment, and attitude of spectators toward the stadium's service provision.

In the past few years, visual optimization in stadium design has significantly advanced, realizing Luigi Moretti's dream of a parametric architecture. {12} This study examines the development of parametric architecture and indicates how new ideas may be incorporated into national and international standards. {12}

Spectator experience is not only limited to in-seat comfort and access to a clear field-of-view. {13} The authors of this research {13} identify a series of additional metrics which when implemented will add further dimensions to the ability to predict the quality of experience in stadiums. Seat integration would describe the connectivity of a spectator to the stadium facilities {13}. This research {13} would draw on and apply the concept of universal distance and analysis of spatial integration.

Since the sensoryscape is an amalgamation of experiences derived from the five senses, it is likely that more positive experiences of the sensoryscape lead to higher levels of satisfaction with the stadium experience. {14} The Author describes both positive and negative feelings grounded in the sensory experiences of the users. It has been proven that a better or more potent sensory experience influences the size of the purchase and, in the case of a successful outcome, increases consumer loyalty. {14}

The author briefly mentions the different sensual experiences that can have negative effects, such as, Visual experience, Auditory experience, Tactile experience, Olfactory experience, and Gustatory experience. {14}

Organized seating within stadiums has allowed for thousands to experience key sporting events in a live setting, there is a stark difference in designing effective seating as opposed to creating an ineffectual seating plan. {15}

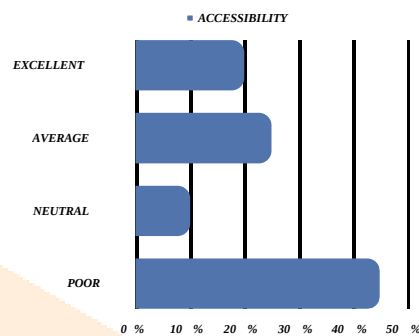
This paper explores the use of computer modelling to optimize sightlines in stadium design. It analyses factors like seating bowl geometry, seat rake angles, and obstruction analysis to ensure clear views from various

seating areas. Several factors need to be taken into consideration when designing an effective stadium-seating layout which includes Field of view, Sightlines, Viewing Distance, Vertical Positioning, Comfort, Safety. {15}

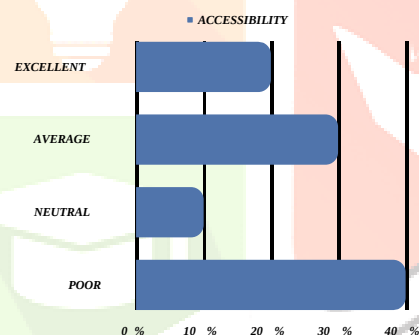
For example, the research article {16}'s author has demonstrated that although certain attributes of a sports facility have no effect on patron pleasure, when taken as a whole, they do. That is to say, fan pleasure is influenced by both team performance and their impressions of the venue itself. {16}

This review {17} explores how stadium design can integrate with the surrounding community. Methods such as Standardization vs. Community, Multi- Purpose Design, Technology and Interaction, Permeability in Design to enhance the user experience {17}

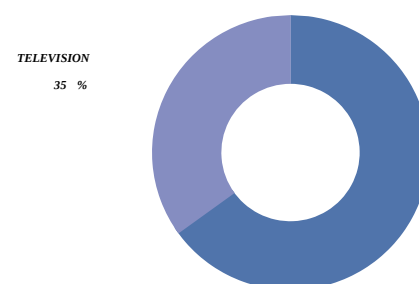
III. PRIMARY STUDY



40% of respondents indicated difficulty accessing the food court, prompting the introduction of a mobile food ordering system.

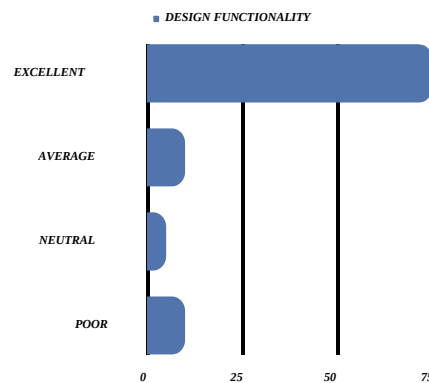


65% of respondents chose to witness the event live at the stadium instead of watching it on television.

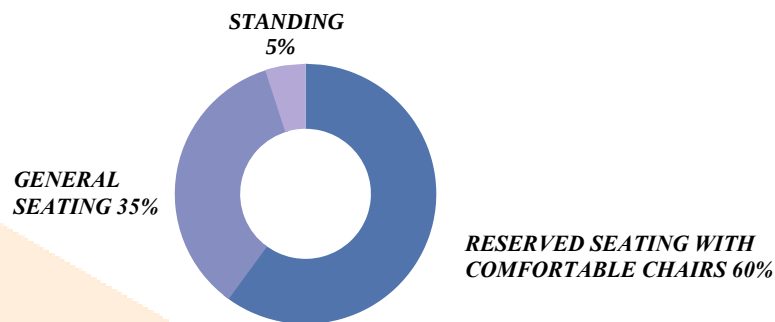


LIVE ACTION IN A STADIUM

60% of attendees rated their stadium experience as excellent, citing factors such as the building's façade, comfortable seating arrangements, and impressive acoustics.



Type of seating preferred when attending a sporting event at a stadium.



IV. INFERENCE

The questionnaire responses have given an overview of how well-thought-out planning and design combined with technology can address most user issues and how a few key elements, like comfortable seating, accessibility, digital experiences, and stadium atmosphere, can improve the overall user experience.

Priority one should be given to the reverberation time. The time it takes for a sound to lose 60 dB is known as the reverberation time. While a shorter reverberation time can make the sound too dry and echo, a greater reverberation time can make the sound muddy and indistinct. For a stadium, a reverberation time of one to two seconds is ideal. This preserves the feeling of space while enabling a clear, natural sound.

Sound absorption is yet another crucial factor to take into account. The capacity of a substance to absorb sound waves is known as sound absorption. Reverberation and echo in a stadium can be lessened with a high level of sound absorption. This can be achieved through the use of sound-absorbing materials such as acoustic panels, sound-absorbing paint, and carpeting.

And last, one crucial factor to take into account is the sound's spatial dispersion. To guarantee that every spectator in the stadium has the same listening experience, the sound should be dispersed equally throughout. Sound-diffusing materials and strategic speaker placement can help achieve this.

Important façade parameters need to be taken into account when designing and building the stadium.

The amount of daylighting is among the most crucial variables. The interior of the stadium is well-lit and user-friendly thanks to proper daylighting. This can be accomplished by optimizing the quantity of natural light that enters the structure through the use of reflective surfaces, skylights, and wide windows in the design. Furthermore, the stadium's energy consumption can be decreased by utilizing energy-efficient lighting solutions.

Ventilation is an additional crucial factor. To guarantee that the air within the stadium is clean and fresh, a stadium needs to have a sufficient ventilation system. This can be accomplished by combining mechanical ventilation systems, such as air conditioning and heating, in addition to natural ventilation systems, like movable windows and vents. Air filtration systems can also aid in the removal of allergens and contaminants from the air.

And last, the façade's aesthetics are a crucial factor to take into account. The stadium's façade needs to be artistically pleasing and convey the essence of the structure. This can be accomplished by employing materials that are both long-lasting and aesthetically pleasing, as well as by adding intriguing and distinctive architectural elements like sculptures and murals.

Any stadium or arena's seating arrangement is crucial since it directly affects how visitors interact with the space. The seating arrangements of an event, be it a concert, football game, or something else entirely, are critical to the audience's overall happiness. Sightlines are the first parameter that needs to be taken into account. The audience's perspective of the playing field or stage is referred to as a sightline. It is crucial to make sure that everyone in a stadium has an unhindered view of the field or stage from their seat. This can be accomplished by making sure that there are no obstacles between the seats and the field or stage, and that the seats are positioned at the proper height and angle.

The comfort level of the seats is another crucial factor to take into account. Long-term attendees should find it pleasant to sit on the seats, especially for multi-hour events. This can be accomplished by making sure the chairs are roomy enough to fit the guests and by utilizing premium materials for the seats.

To avoid back discomfort and weariness, the seats should also be made with sufficient lumbar support.

Another crucial factor to think about is how the seats are arranged. The configuration of the seats ought to facilitate effortless mobility and access to all sections of the stadium. This can be accomplished by making sure that there are enough aisles and exits to facilitate simple mobility in and out of the seating areas, as well as by providing clear and well-marked walkways.

Lastly, one should also take into account the stadium's general environment. To improve the overall user experience, the seating arrangements should be planned to create a vibrant and dynamic ambiance. This can be accomplished by offering a range of seating options, including fan sections and VIP seating, as well as by introducing design elements that produce a setting that is distinctive and captivating.

V. CONCLUSION

When designing and constructing the stadium, consideration should be given to the audience-performer relationship in order to create a truly spectacular stadium user experience. In order to provide viewers with a positive overall experience and increased safety, the facilities should be made to be more easily accessible, secure, and comfortable. This will ultimately attract more spectators. According to the study's parameters, it is known that integrating digital systems can alleviate a variety of problems that users have, and that user-responsive design will raise the likelihood that attendees will return to the events.

In conclusion, improving the user experience in a stadium is greatly influenced by its acoustics. The direct-to-reverberant ratio, sound pressure level, reverberation time, sound absorption, and spatial distribution of sound must all be taken into account to produce the ideal acoustical environment. Any stadium or arena's seating arrangement is an important component that affects how the entire experience is for users. It is imperative to take into account the several seating elements, such as sightlines, comfort, accessibility, arrangement, and mood, in order to improve the user experience. The elements to be taken into account in the design and construction of the stadium include daylighting, ventilation, acoustics, thermal comfort, and aesthetics in order to give a good experience for all users.

The user experience at the stadium can be improved by having a digitally organized stadium with excellent acoustics, digital ticketing, a video board placed in the right spot, and a digital navigating system with a beautifully planned circulation path.

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