

Article

Factors Influencing Experience and Consumption Intention of Membrane Structure Sports Stadiums: An UTAUT Model Analysis

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Abstract

Membrane structure sports stadiums, characterized by high strength, high formability, and distinctive architectural expression, represent an emerging direction in contemporary sports architecture. This study investigates how perceived relative advantage, green value, perceived gain, and social influence affect consumers' intentions to experience and consume in membrane structure sports stadiums, with particular attention to the mediating role of perceived usefulness. Drawing on the Unified Theory of Acceptance and Use of Technology (UTAUT) as the theoretical framework, questionnaire data were collected and empirically tested using structural equation modeling. The results indicate that perceived relative advantage, green value, perceived gain, and social influence have significant positive effects on experience and consumption intention, and that perceived usefulness plays a significant mediating role in these relationships. The study clarifies the mechanisms through which these factors shape intention in the context of membrane structure sports stadiums and offers theoretical and empirical support for their promotion and development.

Keywords: membrane structure; sports stadium; consumption intention; user experience; UTAUT model; green value; architectural design; buildings

1. Introduction

Membrane architecture, as an emerging building typology, has been widely adopted in contemporary architecture due to its distinctive properties and advantages. Alongside its development, a substantial body of scholarship has accumulated. For example, Berger [1] provides a detailed account of the fundamental spatial units and design methods of membrane structures, while Rudolf [2] introduces the design and analytical process of ETFE (ethylene tetrafluoroethylene) cushion roofing systems. Membrane structures typically employ high-strength synthetic fiber materials (e.g., polyester-based fabrics or fluoropolymer-based membranes). This structural form is lightweight, highly flexible, aesthetically expressive, and functionally efficient, which makes it particularly suitable for sports stadiums and large-scale event venues. Beyond these general benefits, membrane structures are tensile systems with highly specialized engineering performance, and their technical characteristics constitute an important foundation for their extensive application in stadium construction. First, membrane materials exhibit excellent tensile behavior. Their high-strength fiber grids can carry substantial tensile forces under relatively low



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self-weight, enabling the overall structural form to remain stable under wind and snow loads while avoiding the heavy long-span beam–column systems typically required by conventional roof structures [3]. Second, modern membrane materials—such as PTFE (polytetrafluoroethylene), PVC (polyvinyl chloride), and ETFE—perform well in terms of durability, with strong resistance to ultraviolet radiation, aging, and corrosion, thereby supporting long-term structural safety in stadium applications. In addition, membrane structures also offer advantages in fire safety. For instance, PTFE membranes can achieve an A-class non-combustible rating and maintain form stability under high temperatures, significantly enhancing safety performance in public buildings [4]. In recent years, with the advancement of smart-building technologies, membrane structures have increasingly incorporated structural health monitoring systems. By using tension sensors, deformation monitoring, and environmental sensing, these systems allow real-time assessment of structural conditions [5]. ETFE, in particular, has attracted considerable attention for large stadium roof design due to its high light transmittance, favorable thermal performance, impact resistance, and lightweight characteristics [6]. Moreover, membrane structures are often streamlined or free-form surfaces; their aerodynamic characteristics can help resist environmental loads and improve overall stability and safety. Collectively, these technical characteristics constitute the engineering advantages of membrane structure stadiums and provide a solid foundation for their widespread adoption in modern sports architecture. Compared with traditional steel or reinforced-concrete buildings, the lightweight design of membrane structures can substantially reduce the overall building weight and alleviate foundation and structural demands, thereby lowering construction and maintenance costs [7]. At the same time, the favorable formability and design freedom of membrane materials enable architects to realize diverse and distinctive shapes and appearances—such as streamlined and curved forms—bringing rich visual effects and a contemporary aesthetic to sports venues [8]. Another notable advantage is the translucent property of membrane envelopes, which allows extensive use of daylighting, reduces dependence on artificial lighting, lowers energy consumption, and provides a brighter indoor environment for both spectators and athletes [9]. The flexibility of membrane structures also enables them to accommodate diverse functional requirements: they can support a wide range of indoor sports activities and can also serve as venues for large-scale events [10]. In addition, membrane structures often have shorter construction periods; owing to their prefabrication capability, on-site installation is relatively straightforward, which accelerates overall project delivery [11].

For example, a typical membrane structure sports stadium, the Grand Palais Éphémère, which was used for judo and wrestling in the 2024 Paris Olympics, has an area of about 10,000 m², with a span of 51 m and a depth of 33 m, and can accommodate 9000 spectators at the same time in its main hall. The double-layer membrane on the surface of the building generates 90% less energy in the manufacturing process than glass and is recyclable. The inner side is covered with an opaque PVC membrane, which can be used to regulate interior light, while the outer side is covered with a transparent ETFE membrane to avoid blocking the wooden structure [12]. The main membrane structure is made up of quickly installed modular structural units with large interior spans without beams or columns, providing a site area of approximately 18,000 m. The building will be completely dismantled after four years, and the materials will be reused in a truly environmentally friendly and low-carbon manner [13]. With the gradual popularization of membrane structure sports stadiums, the focus of related research has begun to turn to how to enhance the consumer experience of membrane structure stadiums. Although membrane structure shows many advantages in terms of technology and economy, most of the existing research literature focuses on the technical performance and cost–benefit analysis of membrane structure and

less on the subjective experience and psychological influence of users, but there is still a lack of systematic research on the specific influence of membrane structure buildings on users' experience and consumption willingness, especially from the point of view of psychology and social behavior. The influence of membrane structure buildings on users' actual feelings and consumption behavior has not been studied yet. Understanding these influencing factors is of great practical significance for optimizing the design of membrane structure venues, improving user satisfaction, and promoting the application of membrane structure technology.

The influence of membrane structure sports stadium experience and consumption intention involves several factors, of which relative advantage, green value, perceived gain, and social influence are key variables. Relative advantage, i.e., consumers' perception of the obvious advantages of membrane structure sports stadiums over other building types, is worth exploring in depth. Relative advantage is the consumer's perception of the distinct advantages that a membrane structure sports stadium has over other building types. These advantages include design innovation, visual appeal, and functionality. For example, the unique shape and light utilization characteristics of membrane structure will enhance the attractiveness of the stadium [14]. Relative advantage can directly affect the consumers' experience evaluation and thus influence their consumption intention. At the same time, the natural lighting characteristics and recyclability of membrane structure buildings make them have high green value [15]; some studies show that consumers have a higher sense of recognition of the environmental performance of buildings, and green buildings can usually better meet the environmental expectations of users, which will be transformed into a higher willingness to consume [16]. Perceived gain refers to the additional value that individuals perceive from experiencing or using a membrane structure sports stadium, such as enhanced visual comfort enabled by natural lighting and the overall spatial qualities created by the membrane structure. These perceived benefits may include comfort, convenience, and other use-related advantages [17]. Perceived gain can influence consumer decisions by shaping overall satisfaction; higher perceived gain typically increases users' willingness to pay. Social influence refers to an individual's perception of social norms and others' evaluations regarding a particular behavior or choice [18]. Under the thesis of membrane structure sports stadiums, social influence includes the perception of the public image and social acceptance of the venue. People are influenced by society's evaluation and social acceptance of membrane structure sports stadiums, which can change their experience and consumption behavior [19].

Based on the above research landscape, it can be observed that scholarly discussions on membrane structure sports stadiums have largely concentrated on technical dimensions such as structural performance, material advantages, and sustainability value. In contrast, research addressing users' subjective perceptions, psychological evaluations, and behavioral intentions in real experience and consumption contexts remains relatively limited. In particular, how key factors—perceived relative advantage, green value, perceived gain, and social influence—jointly shape the public's experience evaluations and consumption intention has not yet been systematically explained in terms of underlying pathways and internal mechanisms. Moreover, the potential mediating role of perceived usefulness in this process lacks sufficient empirical support, leaving the mechanism through which the technical advantages of membrane structure stadiums translate into user-perceived value inadequately clarified.

To address these gaps, this study adopts the Unified Theory of Acceptance and Use of Technology (UTAUT). UTAUT was developed by reviewing and integrating multiple influential models, including the Theory of Reasoned Action (TRA), the Theory of Planned Behavior (TPB), the Technology Acceptance Model (TAM), the motivational model, the

combined TAM–TPB model, the PC utilization model, diffusion of innovations theory, and social cognitive theory. Through a re-selection of key constructs, UTAUT provides an integrated framework for explaining individuals’ acceptance of new technologies. Building on this theoretical framework, we employ UTAUT and introduce perceived usefulness as a mediating variable to examine how perceived relative advantage, green value, perceived gain, and social influence experience and consumption intention toward membrane structure sports stadiums through mediating mechanisms. In doing so, the study seeks to fill the research gap in which few studies have explored the deeper relationship between membrane structure stadiums and the public’s experiential and psychological responses.

2. Literature Review and Research Design

2.1. Relative Advantage, Perceived Usefulness, and Membrane Structure Sports Stadium Experience and Consumption Intention

In the context of membrane structure sports stadiums—where engineering innovation intersects with experiential consumption—spectators’ value judgments are first expressed as a comparative evaluation. Rather than assessing whether a technology is “advanced” in the abstract, they benchmark it against existing venue forms and consider whether experiential outcomes such as viewing quality, spatial comfort, service convenience, and perceived safety have been substantively improved. Rogers [20] defines relative advantage as the extent to which the adopting subject perceives that an innovation or new initiative can achieve superior results compared to the superseded idea or program, emphasizing the perceived advantage of adopting a new technology, and he also finds that perceived relative advantage is positively correlated with his willingness to adopt. Meanwhile, Shih’s study showed that relative advantage plays a key role in the continuous use behavior of Chinese portals and has a positive effect on users’ continuous use intention. Dahlberg et al. [21] found that perceived relative advantage can play a positive role in perceived usefulness. The technology acceptance model proposes that an individual’s behavior in accepting new technology is determined by the individual’s willingness to use, which in turn is determined by the attitude toward use, which is jointly influenced by perceived usefulness and perceived ease of use, while external variables indirectly affect willingness to use and behavior through perceived usefulness and perceived ease of use [22]. The membrane structure sports stadium, with its curved shape, is the building with the lowest wind resistance and is one of the safest buildings compared to the traditional building structures in terms of the potential damage caused by fire.

Moreover, the effects of the structural advantages of membrane structure sports stadiums on spectators’ intentions are typically realized through perceptible experiential cues. Lightweight long-span systems and spatial organization are more likely to generate unobstructed sightlines, a stronger sense of spatial immersion, and greater situational appeal. Structural safety and environmental stability may also alleviate spectators’ concerns about crowding, adverse weather, or unexpected risks, thereby enhancing perceived safety and overall satisfaction. These outcomes, which spectators can directly perceive during attendance and consumption, are synthesized into a comparative judgment regarding whether the venue performs better than conventional stadiums. This judgment constitutes the experiential foundation of perceived relative advantage and may further develop into an evaluation of the venue’s utility and value, namely perceived usefulness. In turn, perceived usefulness contributes to the formation of experience and consumption intention. Accordingly, the perceived relative advantage of membrane structure sports stadiums is expected to influence perceived usefulness as well as experience and consumption intention.

H1a. *Relative advantage positive impact perceived usefulness.*

H1b. *Relative advantage positively affects membrane structure sports stadium experience and consumption intention.*

H1c. *Perceived usefulness plays a mediating role in the relationship between the effects of relative advantage and membrane structure sports stadium experience and consumption intention.*

2.2. Relationship Between Green Value, Perceived Usefulness and Membrane Structure Sports Stadium Experience and Consumption Intention

Green represents nature, life and hope; expresses the spirit of comfort, health and vitality; and refers to a kind of ideology that the environment and human beings live in harmony and develop together sustainably. Green value refers to the value in green environmental protection. Based on the research theory of Sheth et al. [23], consumers will consider the environmental benefits and green value of the products during the consumption process, which fundamentally drives them to consume green products; thus, the green perceived value scale is innovatively developed in the study and the necessity of the existence of green value is verified. Consumers' perceived usefulness from a product or service significantly enhances their willingness to consume [24]. Taking electronic products as the research object, Chen and Chang [25] researched and tested the positive influence of perceived usefulness on green purchase intention. In the field of green consumption, many studies have shown the positive influence of perceived green value on the purchase intention of green products [26,27]. And a membrane structure building is recognized as an energy-saving building, which can achieve great building space with very little resource consumption. The good heat preservation technology makes the maintenance structure and the dome reach the heat preservation coefficient of traditional building's three-seven walls, which achieves the comfortable environment of the stadium in the most energy-saving way [28]. And with the help of automatic air supply system of inflatable membrane structure to solve the air-conditioning air supply, it reduces the investment of indoor air-conditioning equipment and saves the energy consumption of daily equipment.

It is important to note that, in experiential consumption contexts, green value is not merely a moral preference. Rather, it can be translated into a pragmatic assessment of venue utility through perceptible cues associated with comfort and well-being. When spectators develop a stronger perception of health-related benefits from features such as daylight access, energy-efficient operation, and a comfortable indoor environment, green value is more likely to be interpreted as an attribute that is personally beneficial and conducive to a better experience. This interpretation can enhance perceived usefulness and, in turn, strengthen experience and consumption intention. Accordingly, the green value of membrane structure sports stadiums is expected to influence consumers' subsequent perceived usefulness as well as their experience and consumption intention.

H2a. *Green value positively affects perceived usefulness.*

H2b. *Green value positively affects membrane structure sports stadium experience and consumption intention.*

H2c. *Perceived usefulness mediates the relationship between green value and the influence of membrane structure sports stadium experience and consumption intention.*

2.3. Relationship Between Perceived Gain, Perceived Usefulness, and Membrane Structure Sports Stadium Experience and Consumption Intention

Perceived gain is the subjective perception of consumers of the function, utility, brand, and emotional value of the purchased product or service. In the field of commodity trading,

perceived gain can be the utility of the commodity, the satisfaction of the merchant's service, and other value gains, and the consumer's subjective perceived gain of the product is positively related to the perceived usefulness of the product or service [29]. Kuo et al. [30], in exploring mobile value-added services, verified that the higher the perceived usefulness of a service, the higher the user's willingness to pay for the service. The technology acceptance model proposes that the external perception variables of an emerging thing will affect the willingness to use through the individual's acceptance psychology. With the effective intervention of the air filtration system, the air in the membrane structure sports hall is of high quality, which can maximize the health of consumers.

In experiential consumption settings, perceived gain is often reflected in spectators' overall benefit–cost appraisal, and the structural and environmental characteristics of membrane structure stadiums provide concrete and perceptible bases for such evaluations. For example, high-quality air, a comfortable indoor environment, and improved viewing conditions constitute functional and health-related benefits. Greater service and organizational efficiency may reduce time and effort costs, while a more attractive spatial atmosphere can generate affective and hedonic benefits. These benefits are synthesized into a subjective judgment of whether one receives a higher return, which can further strengthen perceived usefulness, namely whether the venue is useful, meets one's needs, and enables a smoother experience. Ultimately, these evaluations contribute to stronger experience and consumption intention. Accordingly, the perceived gain associated with membrane structure sports stadiums is expected to influence consumers' subsequent perceived usefulness as well as their experience and consumption intention.

H3a. *Perceived gain positively affects perceived usefulness.*

H3b. *Perceived gain positively affects membrane structure sports stadium experience and consumption intention.*

H3c. *Perceived usefulness mediates the relationship between perceived gain and the influence of membrane structure sports stadium experience and consumption intention.*

2.4. Relationship Between Social Influence, Perceived Usefulness, and Membrane Structure Sports Stadium Experience and Consumption Intention

In the context of membrane structure sports stadiums, social influence arises not only from interpersonal advice but also from diffusion dynamics and normative pressure generated by the stadium's broader social representation as a landmark building. Membrane-structure venues often have high visual distinctiveness and strong topicality, which facilitates word-of-mouth diffusion and social media dissemination, thereby increasing individuals' sensitivity to how others evaluate the venue and whether it is worth experiencing. In this process, social influence may directly promote the formation of experience and consumption intention, and it may also operate indirectly through informational influence by reshaping utility perceptions. When people in one's social environment express predominantly positive evaluations, individuals are more likely to infer that the venue is useful and capable of meeting their needs, which enhances perceived usefulness and, in turn, strengthens intention [31,32].

A study based on AI usage intention found that perceived usefulness plays a mediating role in social influence and usage intention, and social influence positively affects an individual's perceived usefulness of AI [33]. Singh et al. [34] pointed out that the more a consumer perceives a high level of usefulness, the more likely it is that they will be willing to buy. The integrated technology acceptance model integrates the main ideas from the theory of rational behavior, the theory of planned behavior, the motivation model, and the theory

of diffusion of innovations into four core dimensions, namely performance expectations, effort expectations, social influence, and convenience, and proposes that social influence is the independent variable that has an impact on consumers' willingness to consume. The membrane structure sports stadium not only makes the stadium become a landmark in the city but also increases its attractiveness and popularity with its social influence, which may affect the consumers' subsequent perceived usefulness and experience and consumption intention. Based on this, this paper proposes the following hypothesis:

H4a. *Social influence positive influence perceived usefulness.*

H4b. *Social influence positively influences membrane structure sports stadium experience and consumption intention.*

H4c. *Perceived usefulness mediates the influence relationship between social influence and membrane structure sports stadium experience and consumption intention.*

2.5. Theoretical Foundation and Model Applicability

The primary aim of this study is not to provide a technical evaluation of the engineering performance or architectural aesthetics of membrane structure sports stadiums. Rather, it focuses on the mechanism through which the public forms experience evaluations and consumption intentions when encountering membrane structure stadiums as an innovation-oriented built environment and service setting. From the perspective of the research question, this represents a typical case of acceptance, adoption, and choice intention toward an innovative object in a specific context. Therefore, an integrative model that takes behavioral intention as the central explanatory outcome is theoretically more appropriate.

The Unified Theory of Acceptance and Use of Technology (UTAUT) was proposed by Venkatesh and colleagues through a systematic comparison and integration of multiple classical acceptance theories. It offers a unified explanatory pathway for behavioral intention and subsequent behavior. Its core constructs include performance expectancy, effort expectancy, social influence, and facilitating conditions, and it further posits that individual differences such as age and gender may moderate key relationships within the model [18]. In consumer and experiential contexts, UTAUT has been extended to emphasize the roles of hedonic motivation, price value, and habit, thereby strengthening its explanatory power beyond organizational and workplace settings [35]. Because "experience and consumption intention" toward membrane structure sports stadiums essentially reflects a voluntary choice and repeat-choice tendency regarding a novel stadium form (including its spatial environment, services, and consumption scenarios), the UTAUT logic of utility expectations, normative influence, and intention provides an overarching theoretical scaffold for variable organization and hypothesis development in this study.

Within the UTAUT framework, this study contextualizes and extends key constructs in three ways. First, performance expectancy reflects the extent to which individuals believe that an object can deliver benefits and enhance utility. Given that this study is situated in a consumer experience and consumption-intention context, perceived usefulness is adopted as the primary operational representation of performance expectancy. Relative advantage, green value, and perceived gain are further conceptualized as upstream factors that shape performance expectancy, such that perceived innovation attributes and benefit appraisals strengthen utilitarian judgments and thereby facilitate the formation of experience and consumption intention. Second, social influence in UTAUT highlights the role of significant others' opinions and social norms in shaping intention. Accordingly, this study incorporates social influence as a key exogenous variable and further examines its indirect effect on

intention through perceived usefulness. Third, effort expectancy and facilitating conditions mainly capture the effects of usage barriers, accessibility, and resource support on behavior.

2.6. Research Modeling and Variable Measurement

Based on the previous literature review, six research variables were refined because of the original mature model: relative advantage, green value, perceived gain, social influence, perceived usefulness, membrane structure sports stadium experience, and consumption intention. The research model is shown in Figure 1.

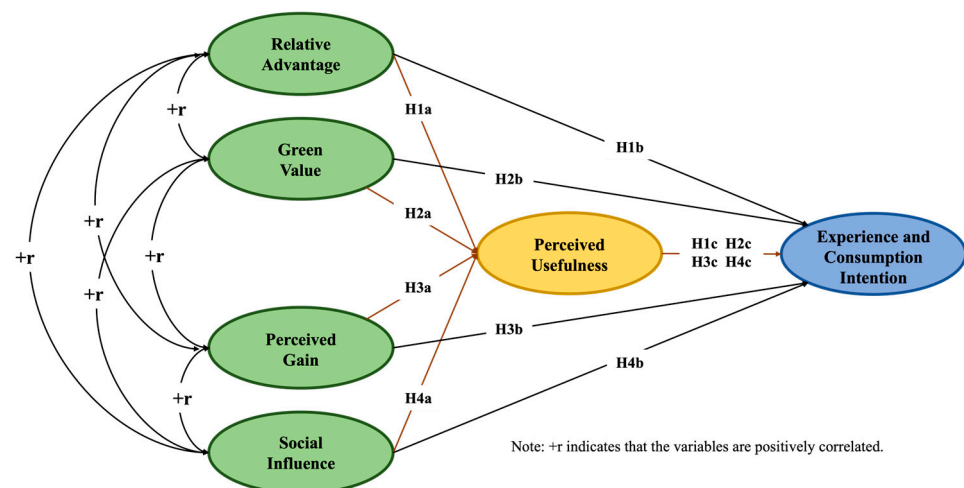


Figure 1. Diagram of the hypothetical model.

Based on the above analysis, this paper is designed to use the questionnaire method for the collection of basic data information. The questionnaire content mainly includes two parts: basic information and research variable information. Among them, the basic information is collected in the form of options; the information on research variables is measured by means of a Likert 5-level scale, with 1 to 5 representing strongly disagree to strongly agree, respectively, and the respondents score the expressions of the question items.

In this study, the measures of relative advantage, green value, perceived gain, social influence, and perceived usefulness are based on the well-established scales developed by Moore et al. [36], Chen [37], Kim et al. [38], Ajzen [39], Venkatesh [35], and others and were formed according to the theme of this paper. The measurement of experience and consumption intention of the membrane structure design sports stadium drew on the mature scale of Zeithaml et al. [40] and formed the 4-item scale for the dependent variable of this paper, which includes “I would like to choose membrane structure sports stadium”, “I would recommend the membrane structure sports stadium to my friends if I had the opportunity”, “I would like to experience the membrane structure sports stadium”, “I would like to experience the membrane structure sports stadium”, “I would like to experience the membrane structure sports stadium”, and “I think it is worthwhile to choose the membrane structure sports stadium for consumption and experience” (see Section 3.4 for details of the remaining questions).

3. Findings

3.1. Descriptive Statistics of Basic Information of the Sample

This research study is mainly carried out through data collection and analysis, so the sample of data collection needs to be in line with the theme of this research—membrane structure sports stadium experience and consumption intention. After reading and comparing the literature, in order to collect a sufficient amount of data for the construction of

the data model, the data collection area is determined to be Xi'an, the center city of North-west China, on the basis of full consideration of the technical conditions required for the construction of sports stadiums, the degree of economic development, and the distribution of the location of the membrane structure sports stadiums. Finally, 729 valid samples were obtained through snowballing and mutual recommendation. The 729 sample subjects all have different degrees of knowledge about this topic, which meets the prerequisites for conducting this research.

According to Table 1, the basic information of the questionnaire can be analyzed in detail. First, in terms of gender distribution, 56.1% are male and 43.9% are female, with slightly more males than females. In terms of age structure, those aged 18 to 25 accounted for 20.7%, those aged 26 to 35 accounted for 36.6%, those aged 36 to 45 accounted for 31.7%, while those aged 46 and above accounted for only 11%. The younger group (especially between the ages of 18 and 35) accounted for a larger proportion, indicating that the questionnaire may be more inclined to collect the opinions or views of young people. In terms of education level, 17.4% of the respondents had junior high school education or below, 52.3% had high school/middle school/vocational high school education, 28.9% had undergraduate/college education, and only 1.4% had postgraduate education or above. This shows that the educational background of most respondents is concentrated in secondary and higher education, with high school, junior college, and vocational high school education as the main force. In terms of occupational distribution, the student group has the highest proportion of 32.9%, followed by establishment personnel with 23.7%, freelancers with 24.1%, and other occupational groups with 19.2%. This data shows that students were the main participants in this survey, and a significant proportion of the working population also participated in the questionnaire. Finally, regarding the percentage of the sports population, 43.3% chose “yes” and 56.7% chose “no”. This means that more than half of the respondents do not consider themselves to be part of the sports population. In summary, the data from this questionnaire show a clear youthfulness and a generally high level of education. The distribution of educational backgrounds and occupations shows diversity, but the student group dominates.

Table 1. Basic information of the sample.

Basic Information		Quorum	Percentage
sex	male	409	56.1
	female	320	43.9
age	18–25	151	20.7
	26–35	267	36.6
	36–45	231	31.7
	46+	80	11
educational level	Junior high school and below	127	17.4
	High school/middle school/vocational high school	381	52.3
	Bachelor's degree/college	211	28.9
	postgraduate student	10	1.4

Table 1. *Cont.*

Basic Information		Quorum	Percentage
careers	schoolchildren	240	32.9
	authorized strength	173	23.7
	profession	176	24.1
	else	140	19.2
sports population	yes	316	43.3
	no	413	56.7

3.2. Reliability and Validity Tests

Before further analyzing the questionnaire data, the reliability and validity of the formal questionnaire scales need to be tested, which is an important guarantee for the reliability of the questionnaire data source and the validity of the questionnaire structure. SPSS 26 software was used to process the questionnaire data, the Cronbach alpha coefficient (Table 2) was used to test the reliability of the questionnaire, Hotelling's T square test (Table 3) was used to illustrate the reliability of the internal reliability of the questionnaire, and the validity of the questionnaire structure was verified by Bartlett's sphericity test (Table 4). Hotelling's T square test, as a widely used multivariate statistical method, is mainly used to compare the mean vectors of two sets of data. It is a standard means of checking whether the mean of a multivariate normal distribution reaches a specific value or determining whether the means of two multivariate normal distributions agree. However, the test loses its applicability when the dimensionality of the sample exceeds the sample size. According to Table 3, Hotelling's T square test on the sample data of the formal questionnaire yields an F-value of 16.944 and a Sig-value converging to 0.000, which is significant and meets the conditions for conducting further data analysis.

Table 2. Reliability statistics.

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Terms	Item Count
0.904	0.907	22

Table 3. Hotelling T² test.

Hotelling T ²	F	df1	df2	Sig.
365.88	16.944	21	708	0.000

Table 4. Validity tests.

KMO and Bartlett's Test		
KMO Sampling Suitability Quantity		0.894
Bartlett's test of sphericity	approximate chi-square	7572.037
	degrees of freedom	231
	significance	0.000

The Cronbach Alpha coefficient is used to test the reliability of the items by calculating the mean of the folded half reliability coefficients obtained by grouping the items in a way that all potential items within the scale are grouped. Cronbach's Alpha is the core method for evaluating the internal consistency of scales. It quantifies reliability by calculating the correlations among various items, laying a reliable data foundation for subsequent

analysis [41]. Based on the above results of the reliability analysis, the overall standardized Cronbach Alpha coefficient is 0.907, and the range of values of the reliability coefficient is between 0 and 1—the closer to 1 the higher the reliability. This shows that the reliability analysis of this survey result has a high level of confidence overall.

According to the results of exploratory factor analysis, the result of the coefficient of KMO test is 0.894; meanwhile, the results of Bartlett's spherical test show that the significance p -value is 0.000 ***, which shows significance at the level, and there is a correlation between the variables, so that this questionnaire has good validity. To sum up, the data of this officially recovered questionnaire has good significance in both reliability and validity, which provides a prerequisite for further data analysis.

According to the calculation results of convergence validity and combined reliability (Table 5), the AVE values of each dimension have all reached above 0.5, and the CR values have all reached above 0.7. In summary, it can be demonstrated that each dimension has good convergence validity and combined reliability. The results of the common method bias test in Table 6 show that the first principal component extracted from the overall population can explain 28.61% of the variance, indicating that the survey data of this study is less affected by the common method bias because this result is significantly less than the critical value of 40%. Therefore, further statistical analysis can be carried out. Meanwhile, to ensure the robustness of the scale data once again, we conducted CFA validation to guarantee the matching degree between the scale and the model. As shown in Table 7, CMIN/DF = 1.961, which is within the range of 3 to 5, RMSEA = 0.033, which is in the excellent range. Additionally, the test results of IFI, TLI, and CFI all reach an excellent level of 0.9 or above. Considering all the above results, the CFA model has a good fit.

Table 5. Convergent validity and combined reliability.

Latent Variable Name	AVE	CR
RA	0.534	0.839
GV	0.610	0.823
PG	0.574	0.846
SI	0.601	0.853
PU	0.568	0.910
ECI	0.591	0.841

Table 6. Common Method Deviation Test.

Component	Initial Eigenvalues			Extract the Sum of the Squares of the Loads		
	Total	Percentage of Variance	Cumulative %	Total	Percentage of Variance	Cumulative %
1	7.718	28.61	28.61	7.718	28.61	28.61

Table 7. Compatibility Test.

Index	Reference Standard	Results
CMIN/DF	1–3	1.961
RMSEA	<0.05	0.033
IFI	>0.9	0.969
TLI	>0.9	0.970
CFI	>0.9	0.974

3.3. Correlation Analysis

In order to explore whether there is a correlation between the variables and the specific degree of correlation, correlation analysis was conducted with the help of SPSS software

(SPSS provides a graphical interface and automated result output in regression analysis, significantly reducing operational complexity and enabling researchers to efficiently verify the predictive relationships among variables [42]), and the results are shown. The inter-subjective effect test is used to explore the intrinsic correlation between different variables through multifactor variable analysis, and if the Sig value is <0.005 , it means that there is a significant correlation between the variables. Because of the large number of data variables studied, we will not list them here but only present the results of representative data analysis (e.g., Tables 8 and 9).

Table 8. Tests for between-subjects effects (1).

Root		Type III Sum of Squares	df	Mean Square	F	Sig.
calibration model	SI1	5.685	4	1.421	2.549	0.038
	SI2	18.984	4	4.746	8.511	0.000
	SI3	20.087	4	5.022	9.006	0.000

Table 9. Tests for between-subjects effects (2).

Root		Type III Sum of Squares	Degrees of Freedom (Physics)	Mean Square	F	Significance
calibration model	PU1	13.686	4	3.421	2.881	0.022
	PU2	12.141	4	3.035	2.556	0.038
	PU3	16.039	4	4.010	3.377	0.010
	PU4	12.357	4	3.089	2.602	0.035

All three constant variables under social influence, under model correction, will have a significant effect on the dependent variable of membrane structure design stadium experience and consumption intention, and the model data are statistically significant. The variables related to perceived usefulness as constant variables in the experience and consumption intention of membrane structure design stadiums have significant correlation, with statistically significant model correlation, and it should be assumed that perceived usefulness will have a significant effect on the dependent variable of experience and consumption intention of membrane structure design stadiums.

In summary, the variables of this study, namely relative advantage, green value, perceived gain, and social influence, all influence perceived usefulness, and at the same time, membrane structure sports stadium experience and consumption intention. Perceived usefulness itself also has a significant effect on membrane structure sports stadium experience and consumption intention, and there is a significant correlation between the different variables.

3.4. Regression Analysis

This regression model was analyzed by multiple linear regression with membrane structure sports stadium experience and consumption intention as dependent variables, and with relative advantage, green value, perceived gain, social influence, and perceived usefulness as independent variables for multiple linear regression analysis. As can be seen from the table, the adjusted $R^2 = 0.453$, indicating that the independent variable can reflect the cause of 45.3% of the variation in the dependent variable. The regression model can explain the variation in the dependent variable well, and the effect is good, but there are still other variables affecting the dependent variable. And the D-W value is around the number 2, thus indicating that there is no autocorrelation in the model and there is no correlation between the sample data, and the model is better. The F-test determines

the significance of the explanatory variable to the dependent variable by comparing the differences between the regression model and the benchmark model that only contains the intercept. In order to increase the scientific accuracy, F test is used to test whether the regression model is meaningful or not; if the model passes the F test ($p < 0.05$), it means that the model is meaningful and at least one X will have an effect on Y. From Table 10, it can be seen that when the model is subjected to F test it is found that the model passes the F test, which also indicates that the model construction is meaningful.

Table 10. F test.

	Mold	Square Sum	Degrees of Freedom	Mean Square	F	Significance
1	regression	263.439	18	14.636	34.533	0.000
	residual	300.909	710	0.424		
	total	564.348	728			

Dependent variable: ECI. Predictor variables: (constants), PU4, PG2, GV1, SI1, RA1, PG3, PU2, PU3, GV4, RA4, RA3, GV3, SI2, RA2, GV2, SI3, PG1, PU1.

According to Table 11, perceived usefulness, social influence, and perceived gain have a more obvious influence, and the combined influence coefficient is more than 50%, which has strong explanatory strength. In addition, the test for multicollinearity of the model found that all the VIF values in the model are less than 5, which means that there is no problem of covariance.

Table 11. Statistical analysis coefficients.

Mold	Unstandardized Coefficient		Standardized Coefficient	t	Sig.	Covariance Statistics	
	B	Standard Error	Beta			Tolerances	VIF
(Constant)	0.352	0.119		2.946	0.003		
I think that membrane structure sports stadiums provide a better viewing experience than other types of stadiums (RA1)	−0.036	0.029	−0.055	−1.251	0.211	0.388	2.575
I think the membrane structure sports stadium enhances my overall experience more than a traditional building (RA2)	0.062	0.030	0.079	2.079	0.038	0.519	1.926
I feel that the membrane structure sports stadium could be more convenient for me (RA3)	0.043	0.029	0.054	1.459	0.145	0.544	1.839
The design of the membrane structure sports stadium makes it more enjoyable for me to come here to watch the games (RA4)	0.068	0.029	0.086	2.331	0.020	0.550	1.818

Table 11. Cont.

Mold	Unstandardized Coefficient		Standardized Coefficient	t	Sig.	Covariance Statistics	
	B	Standard Error	Beta			Tolerances	VIF
I think the membrane structure sports stadium is more environmentally friendly in design (GV1)	−0.007	0.028	−0.010	−0.241	0.809	0.409	2.443
The natural light design of the membrane structure sports stadium makes me think it has more green value (GV2)	0.035	0.030	0.046	1.181	0.238	0.500	2.002
The green nature of membrane structure sports stadiums meets my expectations for sustainable development (GV3)	0.088	0.030	0.111	2.933	0.003	0.521	1.920
The prevalent use of renewable materials in membrane structure sports stadiums makes me feel good about them (GV4)	0.046	0.031	0.055	1.477	0.140	0.541	1.847
I find it cheaper and a better experience to watch the game in a membrane structure sports stadium (PG1)	0.047	0.026	0.075	1.822	0.069	0.440	2.275
Choosing to consume membrane structure sports stadium makes me feel like I've made a wise decision (PG2)	0.064	0.030	0.079	2.132	0.033	0.542	1.844
I feel that participating in the membrane structure sports stadium experience would give me better enjoyment (PG3)	0.091	0.031	0.108	2.909	0.004	0.545	1.834
I think most people think that membrane structure sports stadiums are more advanced than traditional stadiums (SI1)	0.042	0.027	0.064	1.535	0.125	0.434	2.302
I feel it is important for people around me to have an opinion on how I experience or consume membrane structure sports stadium (SI2)	0.066	0.030	0.085	2.238	0.026	0.519	1.925

Table 11. *Cont.*

Mold	Unstandardized Coefficient		Standardized Coefficient	t	Sig.	Covariance Statistics	
	B	Standard Error	Beta			Tolerances	VIF
People around me have a higher opinion of membrane structure sports stadium (SI3)	0.073	0.031	0.095	2.398	0.017	0.476	2.100
I think the membrane structure sports stadium design is favorable to consumers (PU1)	0.004	0.028	0.006	0.148	0.882	0.410	2.438
I find the functional design of the membrane structure sports stadium very useful for spectators (PU2)	0.065	0.031	0.081	2.123	0.034	0.514	1.947
membrane structure sports stadium meets my needs (PU3)	0.079	0.031	0.098	2.581	0.010	0.521	1.920
I think membrane structure sports stadium would make my consumer experience smoother (PU4)	0.076	0.030	0.093	2.543	0.011	0.558	1.792

3.5. Intermediary Analysis

In this paper, we use the membrane structure sports stadium experience and consumption intention as dependent variables; relative advantage, green value, perceptive gain, and social influence as independent variables; and analyze the mediating effect of perceived usefulness between independent variables and dependent variables. According to the results of the mediation effect test in Table 12, it can be seen that in the first step of the test, there is a significant relationship between the independent variables relative advantage, green value, perceived gain, and social influence on the dependent variable, which indicates that the total effect is established, and in the test of model two, the independent variables relative advantage, green value, perceived gain, and social influence have a significant influence on the mediating variable perceived usefulness, while in the third step of the test, the independent variables relative advantage, green value, perceived gain, and social influence have a significant influence on the dependent variable, and the mediator variable perceived usefulness has a significant influence relationship on the dependent variable, thus indicating that the mediating role of perceived usefulness in the model is established.

Based on the results of the above analysis, the mediating role of perceived usefulness between relative advantage, green value, perceived gain, social influence, and the dependent variables membrane structure sports stadium experience and consumption intention are all valid and partially mediated. According to the results of the coefficient test, the proportion of the effect of each hypothesis ranges from 13.91% to 25.4%, of which the mediating effect of perceived usefulness between relative advantage and the dependent variable is the largest at 25.4%, and the mediating effect of perceived usefulness between perceived gain and the dependent variable is the smallest. The mediating effect of perceived usefulness between relative advantage and the dependent variable is the smallest at 13.91%.

Please refer to Table 13 for specific details. To display the analysis results more clearly, the coefficient graph is shown in Figure 2.

Table 12. Mediated effects model test.

	Venue Experience and Consumption Intention	Perceived Usefulness	Venue Experience and Consumption Intention
a constant	0.621 **	0.994 **	0.411 **
	−5.295	−7.001	−3.511
RA	0.154 **	0.186 **	0.115 **
	−5.248	−5.23	−3.972
GV	0.189 **	0.148 **	0.158 **
	−6.65	−4.294	−5.669
PG	0.233 **	0.154 **	0.201 **
	−8.494	−4.634	−7.448
SI	0.235 **	0.207 **	0.192 **
	−8.872	−6.429	−7.27
PU			0.210 **
			−7.088
sample size	729	729	729
R ²	0.418	0.264	0.456
Adjustment R ²	0.415	0.26	0.452
F-value	f (4,724) = 129.974 p = 0.000	f (4,724) = 64.780 p = 0.000	f (5,723) = 121.097 p = 0.000

Notes: ** $p < 0.01$.

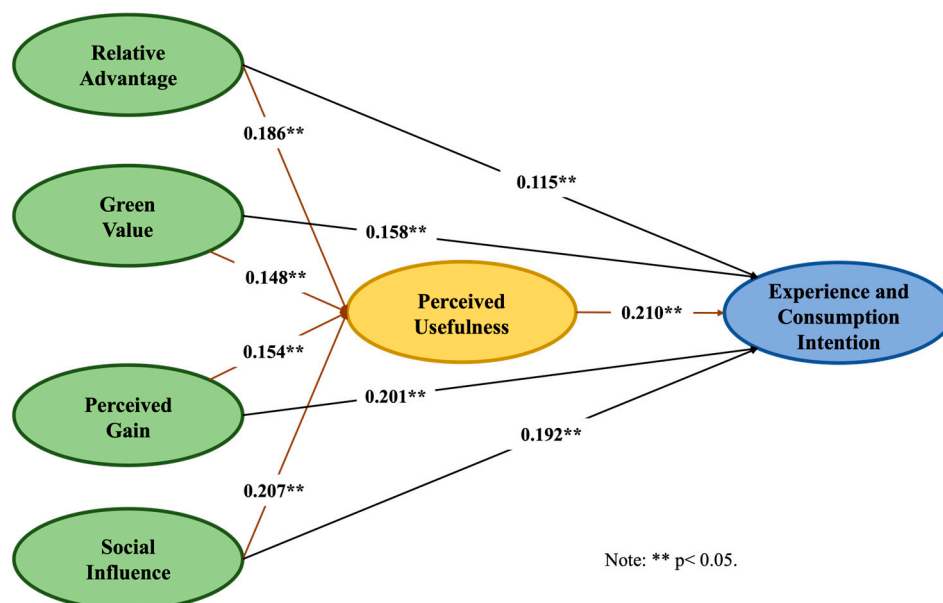


Figure 2. Diagram of the hypothetical model result.

Table 13. Summary of results for mediating effect sizes.

Term (in a Mathematical Formula)	Test Conclusion	c	a × b	c'	Efficiency Ratio
		Aggregate Effect	Intermediary Effect	Direct Effect	
RA=>PU=>ECI	intermediary	0.154	0.039	0.115	25.40%
GV=>PU=>ECI	intermediary	0.189	0.031	0.158	16.46%
PG=>PU=>ECI	intermediary	0.233	0.032	0.201	13.91%
SI=>PU=>ECI	intermediary	0.235	0.043	0.192	18.47%

4. Discussion

4.1. Effect of Relative Advantage, Green Value, Perceived Gain, and Social Influence on Membrane Structure Sports Stadium Experience and Conception Intention

While the empirical results of this study largely align with expectations derived from acceptance and experience literature, their academic relevance should be understood within the epistemic context of architectural research. In studies of sports stadiums and large-span structures, claims regarding improved user experience, comfort, or attractiveness of membrane-structure architecture are frequently asserted on the basis of technical reasoning, material performance, or formal expression, and yet are seldom subjected to systematic, user-centered empirical verification. The present findings contribute by demonstrating that such architectural advantages do not exert a direct or automatic influence on experience and consumption intention. Rather, their effects are primarily realized through perceived usefulness, which functions as a cognitive integration mechanism translating spatial, environmental, and operational qualities into evaluative judgments relevant to behavior. In this respect, the study does not aim to challenge prevailing intuition but to render implicit design assumptions explicit, testable, and empirically grounded. From an architectural perspective, the value of these results lies not in their novelty of direction but in their capacity to clarify how architectural performance becomes meaningful in use. By articulating the mediating role of perceived usefulness, the study helps distinguish between technical optimization and experiential effectiveness, thereby contributing a mechanism-oriented understanding that complements performance-driven and form-oriented stadium research.

In line with the proposed model, this section discusses how the four antecedent factors—relative advantage, green value, perceived gain, and social influence—shape individuals' experience and consumption intention toward membrane structure sports stadiums, and interprets these effects in relation to prior research and the specific features of the stadium context. The results of this paper show that relative advantage has a positive predictive effect on membrane structure sports stadium experience and consumption intention, which is consistent with the findings of Dahlberg et al. [21]. For consumers, the design of membrane structures can effectively provide shading and rain protection, creating a more comfortable viewing environment for spectators; it also enables large span coverage without the need for many internal support columns, which provides a wider field of vision and more unobstructed spectator seating space, which contributes to a better spectator experience. All these advantages over traditional design stadiums increase consumer experience and consumption intention. Green value has a positive predictive effect on membrane structure sports stadium experience and consumption intention. Green value also has a positive predictive effect on the experience and consumption intention of membrane structure sports stadiums, which is consistent with the results of the previous study [27]. Membrane structures are usually constructed with lightweight materials, such as ETFE membranes, which are not only lightweight and strong but also have good weathering and corrosion resistance, which reduces the consumption of construction materials and transportation

costs. In addition, the good ventilation and lighting performance of membrane stadiums helps to reduce the use of artificial lighting and air-conditioning systems, which in turn reduces the energy consumption and carbon emissions [43]. The green value brought by these membrane structure design sports stadiums has the potential to increase consumers' experience and conception intention. The results of the analysis in this paper also show that perceived gain has a positive predictive effect on the membrane structure sports stadium experience and consumption intention, which is consistent with the findings of Featherman et al. [44]. Membrane structure sports stadiums enhance consumer satisfaction and loyalty both in terms of visual experience and artistry, as well as environmental perception and service experience, and these perceived gains increase consumer experience and conception intention. Lastly, the results of this paper show that social influence has a positive predictive effect on the experience and consumption intention of membrane structure sports stadium, and the same result has been obtained by the previous research. Membrane structure sports stadiums are recognized for their unique aesthetic design, excellent functionality, and high quality. With their unique aesthetic design, excellent functionality, environmental protection and sustainability, cost-effectiveness, quick erection, and durability and safety, membrane structure sports stadium have won the favor and recommendation of consumers, and this recommendation, as a kind of social influence, may increase consumers' experience and consumption intention of membrane structure sports stadiums.

4.2. Mediating Role of Perceived Usefulness

Beyond the direct effects identified above, the findings also suggest that intention formation is driven by an underlying cognitive evaluation process; therefore, this section examines perceived usefulness as a mediating mechanism that links the antecedent perceptions to experience and consumption intention. First, the analysis results of this paper show that perceived usefulness plays a mediating role in the relationship between relative advantage and membrane structure sports stadium experience and consumption intention, and that relative advantage will influence consumers' experience and consumption intention through perceived usefulness. The technology acceptance model suggests that adoption intention is determined by behavioral intention, which is jointly influenced by attitude, perceived usefulness, and perceived ease of use; moreover, attitude is jointly determined by perceived usefulness and ease of use, while perceived usefulness is influenced by perceived ease of use [45]. The relative advantage of a membrane structure sports stadium is defined as the advantage of comparing the traditional design of sports stadiums in the process of experience and consumption, specifically through the three aspects of aesthetic design, environmental feeling, and service experience. This is essentially the same as the "perceived usefulness" in technology acceptance theory and the "performance expectation" in the integrated technology acceptance and use model, and the empirical studies of the latter two theories have also proved that perceived usefulness has a positive effect on usage behavior. Secondly, the data show that perceived usefulness mediates the relationship between green value and membrane structure sports stadium experience and consumption intention. Dekhili [24] considered the perceived usefulness factor in the study of green products and found that consumers' perceived usefulness for green products is higher than their perceived usefulness for other products, which is consistent with the results of this paper. The good ventilation and lighting performance of membrane stadiums helps to reduce the use of artificial lighting and air-conditioning systems, thus reducing energy consumption and carbon emissions. Its green value will increase consumers' perceived usefulness, which in turn will increase the experience and willingness to consume.

Meanwhile, perceived usefulness plays a mediating role in the relationship between perceived gain and membrane structure sports stadium experience and consumption inten-

tion, and perceived gain will have an impact on consumer experience and consumption intention via the perceived usefulness influences consumers' experience and consumption intention. The comfort and convenience that consumers feel at the membrane structure sports stadium will increase perceived usefulness, which in turn affects consumers' experience and consumption intention. Finally, perceived usefulness plays a mediating role in social influence and membrane structure sports stadium experience and consumption intention, and social influence will influence consumers' experience and consumption intention via perceived usefulness. The UTAUT model suggests that social influence affects usage behavior through behavioral intention, and the present results are consistent with the theory. Mollenkopf et al. [46] showed that neighbors, family members, and colleagues are the main interpersonal groups in consumers' social network relationships, and when consumers are surrounded by friends and family who experience and consume at the membrane structure sports stadium, due to the high intimacy and interaction between consumers and friends and family, consumers will be more trustworthy and reliant on the information given by friends and family when making decisions about experience and consumption. When consumers make experience and consumption decisions, they will trust and rely more on the information given by their friends and family, thus increasing their experience and consumption intention of membrane structure sports stadium.

4.3. Theoretical Contributions

It should be emphasized that the architectural insights offered by this study are interpretive rather than prescriptive. The research does not seek to introduce new spatial typologies, formal languages, or quantitative performance thresholds. Instead, it identifies which dimensions of architectural performance are more likely to be cognitively recognized and behaviorally consequential for users, and under what conditions such recognition occurs. This distinction is critical, as it suggests that not all technically superior features are equally salient in shaping experience, and that perceptibility and usability mediate the relationship between architectural innovation and user response.

Compared with existing studies, the value of this research does not lie in a straightforward transfer of UTAUT to a sports-stadium setting. Rather, it lies in bringing the architectural features of membrane structure sports stadiums, spectators' experiential judgments, and an intention-based behavioral model into a single explanatory framework. This integration allows a more direct answer to a question that remains underdeveloped in the literature: which architectural advantages matter, through what psychological mechanisms, in shaping consumption-related intentions?

First, the study advances the contextualized use of UTAUT beyond conventional "technology objects". UTAUT was originally developed to explain information-technology acceptance, highlighting the predictive power of constructs such as performance expectancy and social influence, and it was later extended to consumer contexts by incorporating value- and experience-related factors. In research on sports facilities and architectural experience, however, the dominant line of inquiry has typically proceeded through service environment or service-quality pathways—linking perceived quality to satisfaction and loyalty—while offering a more limited account of how innovation attributes translate into intentions via utility expectations [47,48]. By conceptualizing membrane structure sports stadiums as an innovation-oriented venue forms and treating spectators' experience and consumption intention as a voluntary choice tendency, this study demonstrates that UTAUT's intention-formation logic can be meaningfully mobilized to explain decision-making in the domain of sports-architecture experience.

Second, the study offers a more mechanism-oriented account of green value and experiential benefits. Green value has been widely recognized in consumption research as

an important value orientation that promotes green purchase intention [49]. Yet in many studies, green value appears primarily as a direct predictor, with less attention to how it becomes incorporated into concrete utility appraisals [50]. Our findings indicate that green value not only exerts a direct influence on experience and consumption intention but also operates indirectly through perceived usefulness. This suggests that, in the setting of membrane structure stadiums, “green” is not merely a moral or ideological preference; it is often translated into a utilitarian judgment via experiential cues such as daylighting, ventilation comfort, and energy-saving performance, thereby entering spectators’ evaluations of whether the venue is worth experiencing.

Third, by centering perceived usefulness as a core mechanism, the study consolidates multiple antecedent pathways into a coherent explanatory chain and improves the consistency of intention explanation in the stadium-consumption context. TAM and UTAUT research has repeatedly shown that external factors often influence intention through perceived usefulness [51]. In leisure-service and sport-venue research, environmental factors have also been shown to affect revisit and consumption behaviors, yet evidence that connects these influences into an integrated mechanism remains relatively limited [52]. This study demonstrates that relative advantage, green value, perceived gain, and social influence can all shape experience and consumption intention via perceived usefulness. The implication is that spectators’ evaluations are not driven by a single factor; rather, they synthesize spatial quality, green cues, benefit–return considerations, and social information into an overarching utilitarian judgment, on the basis of which intentions are formed.

4.4. Practical Implications

From a practical perspective, our findings suggest that the technical and spatial advantages of membrane structure sports stadiums do not automatically translate into visitation and consumption behavior. Their influence is largely realized through spectators’ utilitarian evaluations formed during attendance, namely whether the venue is helpful, worthwhile, and capable of meeting one’s needs. Accordingly, the central task of both design and operation is to translate structural advantages into stable, perceptible experiential outcomes and to ensure that these outcomes remain reliable under peak-use conditions. In this sense, the study offers a design-oriented lens for converting technical and spatial advantages into user choice, which can inform scheme selection, the refinement of critical design nodes, and the prioritization of renovation interventions.

At the design level, the salience of perceived relative advantage indicates that the potential benefits of membrane systems must be delivered as experience outcomes that spectators can directly compare. The unobstructed space enabled by lightweight long-span structures is more likely to be integrated into judgments of a superior overall experience and stronger willingness to attend only when it is systematically realized through seating geometry and sightline organization, roof coverage for shading and weather protection, circulation efficiency from entry to concourse to stands, accessibility of services, and evacuation performance during high-demand periods. Design decisions, therefore, should not revolve solely around form-making and structural expression. Key experiential constraints such as sightlines, thermal comfort and waiting experience, crowding and queue management, and the legibility of wayfinding should be incorporated from early stages as criteria of equal importance to the structural scheme, so that architectural advantages can be consistently perceived in real use.

The effect of green value points to another actionable pathway. Green attributes are more likely to enter utilitarian evaluations and translate into intention when spectators can perceive and understand how they improve the experience in concrete terms. Thus, strategies related to daylighting, ventilation, and envelope energy performance should not

only aim at meeting technical targets but also attend to their experiential manifestation, such as visual comfort produced by daylight, bodily stability associated with airflow and thermo-hygrometric conditions, and the legible presence of materials and assemblies. Compared with abstract sustainability narratives, embedding green strategies into experiential spatial cues is more conducive to forming sustainability-related value recognition and strengthening visitation tendencies. In addition, the significance of social influence implies that landmark character and communicability can be treated as part of facility design. Given the strong recognizability often associated with membrane-structure venues, designers may cultivate clear spatial “memory points” at key nodes such as entrances, public halls, and concourse viewpoints, thereby facilitating word-of-mouth diffusion and positive social evaluation without compromising functional efficiency. Importantly, communicability cannot substitute for the use experience itself. Only when perceived relative advantage, green value, and perceived gain remain consistently valid in the lived spectator experience can social recommendations accumulate in a stable manner and exert a durable influence on intention formation.

Taken together, these implications do not prescribe quantitative performance thresholds, but rather articulate experience-oriented design principles derived from user perception. They suggest that membrane structure stadium design should prioritize the perceptibility of spatial advantages, the experiential translation of environmental strategies, and the alignment of landmark expression with functional reliability. Such principles provide an architectural basis for linking technical innovation with user-centered evaluation, complementing performance-driven stadium research with evidence on how design is actually received and valued in use.

5. Conclusions and Shortcomings

In order to explore people’s perceived attitudes towards membrane structure sports stadium in the present day, this paper introduces the UTAUT model to explore the influencing factors of membrane structure sports stadium experience and consumption intention. The results show that relative advantage, green value, perceived gain, and social influence all influence perceived usefulness and also significantly influence membrane structure sports stadium experience and consumption intention, and perceived usefulness itself also has a significant effect on membrane structure sports stadium experience and consumption intention. There is a significant correlation between the different variables.

This paper is significant at both theoretical and practical levels. From the theoretical level, the application of the UTAUT model to the experiential research of membrane structure sports stadium enriches the academic theories in the field of membrane structure construction and provides new perspectives and theoretical support for the research in related fields. From the practical level, the results of this paper will provide some empirical evidence for the optimization of membrane structure sports stadiums, which will help to improve the use efficiency and audience satisfaction of membrane structure sports stadiums, and then promote the application and popularization of membrane structure technology in sports stadiums. By filling the gap of membrane structure sports stadium experience and consumption intention research, we hope to provide some support for the promotion and application of membrane structure technology in the field of sports.

The present study is subject to several limitations. First, the external validity and representativeness of the sample warrant cautious interpretation. After considering the technical conditions, level of economic development, and spatial distribution of membrane structure sports stadiums, we selected Xi’an, a major city in Northwest China, as the primary data collection site and obtained 729 valid responses via snowball sampling and peer referral. Because the sample was drawn from a single city and collected through a non-probability

procedure, homophily within respondents' social networks may have introduced systematic sampling bias. Accordingly, the findings should be interpreted as evidence of the proposed mechanisms within a specific urban context and comparable settings, rather than as conclusions that can be directly generalized to a national population or to cross-cultural environments. Furthermore, the sample exhibits an imbalanced demographic profile: males account for 56.1% and females 43.9%; respondents aged 18–35 comprise 57.3% of the sample, and students account for 32.9%, indicating a relatively young and concentrated respondent composition. Prior research suggests that males may display stronger willingness than females to experience and adopt novel offerings and that experience evaluations and consumption intentions may vary across age cohorts [53]. These distributional characteristics may therefore influence parameter estimates and the strength of structural relationships. To mitigate such concerns, we controlled for gender and urban–rural status in the empirical analyses. Future studies should extend data collection across multiple regions (e.g., eastern, central, and western China), cities of different tiers, and culturally diverse contexts; employ stratified random or quota sampling to enhance representativeness; and conduct multi-group analyses—ideally accompanied by measurement invariance testing—to examine whether the proposed model differs across gender, age, and urban–rural groups, thereby clarifying boundary conditions and potential regional specificity. Second, all measures were obtained from self-report questionnaires, which may introduce common method variance and subjective measurement error. Respondents' social desirability tendencies, recall bias, and situational influences at the time of survey completion may affect the accuracy of construct measurement. Future research could incorporate multi-source and behavior-based indicators (e.g., actual attendance records, ticket-purchase behavior, and platform-based reviews), adopt time-lagged or longitudinal designs to strengthen causal inference, and employ experimental manipulations or intervention-based approaches to more rigorously examine the effects of key antecedents (e.g., relative advantage) on experience and consumption intention, as well as the underlying psychological mechanisms.

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