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Segmenting the Perception of Physical Environment and Satisfaction for Baseball Spectators

Chun-Chu Yeh,[1] Anthony S. C. Huang[2], Chiung-Hsia Wang[3] and Chin-Huang Huang[4]

[1]Department of Tourism and Hospitality, Transworld University
E-mail: joyceyehh@yahoo.com.tw
[2]Department of Sport Information and Communication,
National Taiwan University of Sport, Taiwan
E-mail: ahuang@ntupes.edu.tw
[3]Department of Sport Management, National Taiwan University of Sport, Taiwan
E-mail: wangch@ntupes.edu.tw
[4]Department of Sport Management, National Taiwan University of Sport, Taiwan
E-mail: hch55@ntupes.edu.tw

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ABSTRACT The physical environment has a great impact on the spectators' overall experience and their behavior intension. The goals of this paper were to examine the quality of physical environment and the satisfaction of spectators during the 2010 Intercontinental Cup Baseball Competition (ICBC). The researchers adopted exploratory factor analysis and extracted five major factorial dimensions of the stadium's physical environment. They were environmental tidiness or seat comfort, space or sign design, traffic convenience, architectural aesthetic, and the functions of scoreboards. Next, the cluster analysis was used to identify the characteristics of the audience's perception into three groups, transportation accessibility and architectural aesthetic, total pursuit of quality, and stadium design and cleanliness. Results showed that all five dimensional factors have an obvious effect on satisfaction, and the 'total pursuit of quality' was the most important market segment and had the highest satisfaction.

INTRODUCTION

Sports is a growing industrial sector in the global economy, and understanding the spectators' satisfaction is crucial for managers of the sports complex. Since sport managers have little or no control over the results or the progress of a game itself, they need to focus more on controllable extensions, such as service and physical environments (Mullin et al. 2000). Sports team owners are also increasingly wanting to know how to raise the sports audiences' satisfaction while attending a sporting event. Previous studies had shown that spectators' experience, consumption behaviors, and satisfaction were affected by the overall components of stadium environment, such as facility service quality, entertainment and social interaction. (Caro and Garcia 2007; Greenwell et al. 2007; Moreno et al. 2015; Plamero and Price 2015; Tsuji et al. 2007). These components also affect the spectators' and fans' decisions on staying longer or attending more games at this stadium in the future.

Wakefield and Sloan (1995) defined 'sportscape' as the use of fixed elements in facilities at a sports complex. This includes interior and exterior layouts and design. Interiors include layout plans, furniture, graphics, flooring and accessories, and exteriors contain the architectural, landscape, and site design. The environmental quality of sports events also plays a significant role in the level of spectators' enjoyment experience. Those physical layouts also influence the box office income and a stadium's relevant revenues (Bitner 1992; Wakefield and Sloan 1995; Wakefield et al. 1996). Consumer satisfaction is obtained from the overall experience, which is usually assessed between the cognition of pre-purchase expectations and actual responses (Churchill and Suprenant 1982; Dovidow and Uttal 1989; Engel et al. 1995; Oliver 1981). The environmental quality of sites also affects tourists' satisfaction (Bitner 1992).

Address for correspondence:
Chiung-Hsia Wang
Department of Sport Management
National Taiwan University of Sport
Telephone: +886-5-362-1260 #6162
Fax: +886-5-362-8436
E-mail: wangch@ntupes.edu.tw

Market segmentation can help managers focus on the specific needs of customers. Wendell (1956) first proposed the concept of "market segmentation". The main idea is to divide a large and complex market into several smaller markets, whereby each smaller market contains certain specific characteristics that may require different services or products. Porter (1990) defined "market segments" as heterogeneous market segments according to the specific characteristics, separating them into several more homogeneous groups. Therefore, the managers can develop different products, services, or marketing mix to meet the different needs of various submarkets, which is an approach that is also known as target marketing.

Kotler (1997) defined segmentation as distinguishing and identifying various characteristics such as purchasers' desire, geographic location, purchasing power, buying attitudes and buying habits. Kotler further developed three stages of market segmentation, namely, the survey stage, analysis stage, and profiling stage. Since market segmentation can be used to provide more information on the spectators' characteristics, managers can enrich the content to meet the needs of different audience groups and attract audiences of different ethnic characteristics (Lee et al. 2004).

Up until now, no researcher in literature has paid attention to basing segmentation on the perceptions of the physical environmental quality of a sports stadium. Since all managers target to maximize various spectators' satisfaction, the researchers look to fill this gap in the literature. Given a limited budget, it is quite important and necessary for managers to understand how to more efficiently allocate limited funding resources towards comfortable factors.

The physical environment generally means the physical space where the activities and behavior of consumers around (Baker 1987; Bitner 1992). It influences the consumer approach or avoidance intentions and determines future consumption behavior. Previous studies showed that the physical environment has a far-reaching impact on consumer behavior in hotels, restaurants, and banks and other service-based industries (Baker et al. 1992; Baker et al. 1988; Baker and Crompton 2000; Ballouli and Bennett 2014; Booms and Bitner 1982; Donovan and Rossiter 1982; Hightower et al. 2002; Palmero and Price 2015; Turley and Milliman 2000). For example, music volume, music tempo, and music preference affect customers' shopping behaviors, in terms of the amount of money and time spent and the perceptions of the whole store environment (Turley and Milliman 2000). Areni and Kim (1993) found a classical music background leads to higher sales, by inducing consumers to buy more expensive items. A pleasant atmosphere also encourages consumers to spend extra time and more unplanned money in a store (Donovan et al. 1994). Bellizzi and Hite (1992) presented that consumers exhibit higher stimulated purchase rates in a blue environment than in a red one. Hirsch (1995) showed that a specific fragrance in a Las Vegas casino enhances the gambling mood, thus encouraging consumers to stay longer. A fitted music in a stadium retail store increases the stratification of the shopping experience and enhances favorable effects on the store environment. It also raises the audience's willingness to pay for products, increasing the revenue of organizers (Ballouli and Bennett 2014).

Related studies on the environmental quality of sports facilities have examined either seasonal professional sports events at a specific venue, such as college football, NBA, and minor league hockey league (Kahle et al. 1996; Pease and Zhang 2001; Wakefield and Blodgett 1994, 1996; Wakefield et al. 1996; Wakefield and Sloan 1995; Zhang et al. 2001) or regular events, such as the Professional Golf Association tournaments (Lambrecht and Kaefer 2009). Few studies have focused on how the quality of the physical facility environment affects the spectators' satisfaction (Lambrecht et al. 2009; Wakefield et al. 1996; Wakefield and Sloan 1994, 1995). The quality of baseball stadiums and physical facilities has been found to play an important role on influencing participants' satisfaction (Wakefield and Blodgett 1994; Uhrich and Benkenstein 2010). The 'sportscape' of a baseball field environment encompasses the service entity, the surrounding environment, interior design, spatial arrangement, and sign devices. Some controllable factors include traffic areas, considerable convenience, crowd control, merchandise, parking, personnel (staff or volunteers), toilets and seats. (Lambrecht et al. 2009). Wakefield and Blodgett (1994) showed that a stadium's comfortable environment increases the level of excitement and satisfaction of sports spectators. It has been shown that spectators are not only eager to stay in a comfortable environment, but are also more likely to come

back to the same venue in the future (Palmero and Price 2015; Wakefield and Sloan 1995; Wakefield et al. 1996). Wakefield et al. (1996) examined various physical environmental factors that could affect the audience's participation for MLB and NFL stadiums. They found that the closeness and beauty of the venues and facilities, the quality of the scoreboard, seating comfort, design and layout of proximity to the playing field, regional configuration, and signage are the main factors influencing the audience's satisfactions. Lambrecht et al. (2009) looked at the physical environments for eight professional golf tournaments. They found that parking, accessibility routes, trafficking area, seats, merchandise, congestion control, toilets, and assistant from staff or volunteers enhance spectators' participation and satisfaction. Overcrowding also affects their pleasure. If it is hard to reach important destinations (for example, seats, food service areas or toilets), then this reduces the spectators' desire to stay at the venue (Wakefield et al. 1996).

The majority of audiences do not want to spend too much time looking for parking spaces or walking to the destination. Returning to the parking location quickly and smoothly after the game is also important to spectators (Wakedfield et al. 1996; Lambrecht et al. 2009). An unpleasant parking experience prompts people to leave a game early in order to avoid congestion or to stay away from games and events in that arena in the future, which would decrease revenue (Wakefield et al. 1996).

Beautiful art design features and decorations, both inside and outside, make a stadium more attractive. Brightly painted seats and steps are more eye-catching than unpainted gray concrete walls or monotone color seats and steps (Tom et al. 1987). Layout accessibility presents the design and spatial pitch signage, and clear indicators help the audience find the right destination, so that they can easily reach the place they want. Poorly designed seat space on the field can cause the spectators to have a crowded perception (Wakefield et al. 1996). A large screen or a multifunctional scoreboard that displays a lot of functions during a game provides not only game and player information, but also can be used as a marketing and entertainment tool. The primary service factor is the issue of a stadium being clean. When the bathrooms are full of garbage, crowded, or the floor is very wet, the spectators may feel that is dangerous to use public facilities, which will affect their satisfaction (Moreno et al. 2015; Palmero and Price 2015; Wakefield and Sloan 1995).

The high quality of the physical environment not only increases consumers' satisfaction and intention to participate again, but also creates additional value for the sports event itself (Uhrich and Benkenstein 2010). Bristow and Schneider (2003) indicated that market segmentation must be carried out according to different characteristics of the audiences to meet their specific needs at sports events.

Based on the experience of spectators, the consumption behavior and satisfaction of sports fans are affected by the factors of the stadium environment and facilities, including stadium traffic, location convenience, internal circulation, interior design, seat comfort, space design, game matchups, the contents of the game, and the presence of their favorite players. Segmentation can help provide more information on visitor characteristics, which provide managers with marketing strategies to meet the needs of different audience groups and to attract audiences of different ethnic characteristics. However, researchers have seldom paid attention to market segmentation based on the perceptions of the physical environmental quality of a stadium. Therefore, this paper analyzed the spectators' perception of the environmental quality of baseball field for market segmentation to identify the characteristics of different groups of audiences. The results help fill the gap in the related literature.

Objectives

The purposes of this paper are to explore the perception of the physical environment of spectators in a baseball stadium through exploratory factor analysis and examining with regression analysis whether the factors will impact the satisfaction of spectators during the 2010 Intercontinental Cup Baseball Competition (ICBC). In order to increase the understanding of spectators' satisfaction among various demographic characteristics, cluster analysis was also adopted to segment different consumption habits of the sports fans.

The remainder of the paper is organized as follows. The methodology contains some background information and description of basic

statistics. The next section presents the main results and implications for various analyses. The last section discusses the implications of findings for facility managers to improve environmental quality along with business strategies.

METHODOLOGY

Study Site and Data Collection

This study conducted a survey on spectators to gauge their satisfaction of the 'sportscape' at the 2010 17th ICBC at Taichung Intercontinental Baseball Stadium (TIBS) and Douliu Baseball Stadium (DBS). This competition was hosted from October 23 to 31, 2010 in Taiwan. Ten teams were invited to compete, namely, Chinese Taipei, Cuba, Czech Republic, Hong Kong, Italy, Japan, South Korea, Netherlands, Nicaragua, and Thailand. Thirty-six games were played in both stadiums.

Baseball is the most popular spectator sport in Taiwan. It has the highest spectator participation rate (that is, 55.1%) among all sports. The majority of Chinese Taipei national baseball team players came from Chinese Professional Baseball League (CPBL). Others came from Minor League Baseball, Nippon Professional Baseball, or other amateur training teams. The 17th ICBC attracted a total of 53,356 on-site spectators during the period.

The statements of the questionnaire on the physical environment and satisfaction of the baseball field were ranked on a five-point Likert scale (1=Strongly disagree and 5=Strongly agree). The main items of the spectators' perceptions for the sports physical environment were generated from Wakefield and Sloan (1995), Wakefield et al. (1996), and Lambrecht et al. (2009). Some other items were also considered based on the actual environmental scenarios of TIBS.

Face-to-face on-site samples were conducted by trained interviewers during the 17th ICBC. During this period, 450 people were asked to participate, and 424 complete replies were obtained, yielding a 93.78 percent response rate. The respondents comprised 282 males and 142 females. The main age group was between 19 to 34 years old, comprising 77.4 percent of the total. Respondents with a university education degree totaled 267, that is, sixty-three percent.

Analysis Methodology

This paper adopted exploratory factor analysis for identifying the underlying major factorial dimensions of spectators' perception of the physical environmental quality. Following Kaiser (1974), Bartlett's test of sphericity and the Kaiser Meyer Olkin (KMO) test and Varimax rotation procedure were used to determine the appropriateness of the sample data. To increase the understanding of various spectators' needs and perceptions of the stadium's physical environment, a further cluster analysis was adopted to identify the underlying segmentation. Ward's hierarchical method and K-means clustering method were used to divide all the samples into several clusters (Hair et al. 1998; Lee et al. 2004). The Scheffe test explored the differences between all clusters with respect to each factor.

After extracting the major factorial dimension, this paper executed cluster analysis. One way to explore a spectator's needs is to identify the underlying segmentation in a market, that is, acknowledging that needs likely vary across various groups. Next, ANOVA was performed to test the differences in satisfaction with clusters, and then chi-square tests were taken to view audience clusters of different socio-economic background differences. Regression analysis was then implemented to examine the effect of the physical environment of the cognitive factors. Lastly, each cluster was broken down into various different socio-demographic characteristic groups to understand the specific group needs at sports events.

RESULTS

The quality of the physical environment court questionnaire had 20 items, where the highest average score for *"can easily walk to the parking lot"* is 3.95. The second is *"the sports stadium is an attractive modern building"* at 3.92. In contrast, the lowest score, *"I felt there are enough trash cans in the sports stadium"* is 3.42, the next lowest scores are for *"I can easily purchase the products"* and *"comfortable stadium seating"* at 3.45 and 3.51, respectively.

After identifying the underlying major factors of the perceived physical environment, the KMO value is 0.90, and the Bartlett test of sphericity has a p value lesser than 0.01. This indicates the variables are correlated, and that factor

analysis is appropriate for further analysis. For the principle component method and Varimax rotation procedure, nineteen items of environmental quality remained for further analysis. There are five dimensions with a factor loading greater than 0.5, indicating a reasonably high correlation between the delineated factors and individual items. All five factors had Eigen values greater than 1, accounting for 73.49 percent of the total variances. All factors had relatively high reliability (Cronbach's a) ranging from 0.84 to 0.91 (Table 1).

The first dimension is labeled *"environmental tidiness/seat comfortableness"*, which resulted in 43.25 percent of the total variance with a reliability coefficient of 0.86. The relatively large proportion of the total variance for that factor might be attributed to the basic and fundamental services by the baseball stadium. The second dimension is labeled *"space/sign design"*, which accounted for 9.86 percent variance with a reliability of 0.85. The third dimension is labeled *"traffic convenience"*, which accounted for 7.95 percent variance with a reliability of 0.84. The fourth dimension is labeled, *"architectural aesthetic"*, which is explained by 6.54 percent variety of the total variance with a reliability of 0.88. The final dimension is labeled, *"functions of scoreboards"*, which explained the other variances of 5.88 percent with a reliability of 0.91 (Table 2).

Based on the cluster analysis and Ward's hierarchical method, a three-cluster solution was found to be the most appropriate. Cluster I is named "convenience and architectural seekers" based on the mean scores of various factors and characteristics. This cluster contained 73 spectators and had the highest mean score on "traffic convenience" and the second highest mean score on "architectural aesthetic". However, "space/sign designs" has the lowest mean score among all clusters. Cluster II is named "total pur-

Table 1: The factor analysis results of the physical environmental of a baseball stadium

Variables	*Factor loading*				
	Environmental tidiness / seat comfortableness	*Space / sign design*	*Traffic convenience*	*Architectural aesthetic*	*The functions ot scoreboards*
I felt the seats are clean.	0.83				
I felt the overall stadium is clean.	0.77				
I felt the toilets are clean.	0.76				
I felt there are sufficient trash bins in the interior and exterior of the stadium.	0.61				
The stadium provided comfortable seats.	0.50				
The signs are clear so I can find my seat easily.		0.83			
The signs directed me to the correct way.		0.82			
The design of the stadium allows me to easily to go the place I desire.		0.72			
The design of venders allows me to easily purchase products I desire.		0.50			
The location of the stadium is convenient.			0.83		
The traffic allows me to arrive at the stadium conveniently.			0.80		
The parking lots of the stadium are enough.			0.75		
When the game is over, we can easily walk to the parking lots.			0.72		
The color of the stadium is attractive.				0.86	
The stadium is a modern building.				0.84	
The architecture of the stadium is attractive.				0.81	
The stadium scoreboard is entertaining.					0.87
The stadium scoreboard enhances the excitement of the sports game.					0.86
The stadium has a good quality scoreboard.					0.78
Eigen-values	8.7	1.9	1.5	1.2	1.1
Cumulative explanatory variance(%)	43.25	53.11	61.06	67.60	73.49
Reliability (Cronbach's á)	0.86	0.85	0.84	0.88	0.91

Table 2: Physical environment cluster analysis results

Cluster	*Cluster I*	*Cluster II*	*Cluster III*	*F value*	*Scheffe's test*		
Environment	*n=73*	*n=203*	*n=148*		*I-II*	*I-III*	*II-III*
Environmental tidiness / seat comfortableness	3.05	4.06	3.11	119.99***	***	-	***
Space / sign design	2.84	4.10	3.64	130.92**	***	***	***
Traffic convenience	4.00	4.30	3.21	125.05**	***	***	***
Architectural aesthetic	3.83	3.92	3.80	0.946	-	-	-
Functions of scoreboards	3.03	4.05	3.35	52.838***	***	**	***
Cluster naming	transportation accessibility and architectural aesthetic		total pursuit of quality	stadium design and scoreboards			

1. ** means significant level of 5 percent;*** means significant level of 1 percent.

suit of quality" and contained 203 spectators, representing the largest group. "Traffic convenience" had the highest mean score across all factors and clusters, whereby the second highest score was "space/sign design" at 4.30. This cluster also had the highest average score among all clusters (that is, the lowest average score of 3.92). Cluster III is named "stadium design and scoreboards" and contained 148 spectators. "Architectural aesthetic" and "space/sign design" had the highest two scores, respectively.

According to the Scheffe post hoc test, three clusters also had significant differences on satisfaction, that is, F=20.48, except for the "architectural aesthetic" factorial dimension (Table 3). Overall, the "total pursuit of quality" (Cluster II) had the highest mean score on satisfaction. "Transportation accessibility and architectural aesthetic" had the lowest mean score on satisfaction.

This study adopted ordinary least squares estimation, regressed on the independent variable, which can explain the satisfaction of spectators. The dependent variable is overall satisfaction, and the five dimension factors of physical environment stadium are independent variables. The regression model passed the goodness of fit test at a one percent significance level (F value is 66.84), which indicated that the null hypothesis could be rejected for all coefficients of independent variables that are not equal to zero. The variance inflation factors (VIF) were calculated to test for collinearity of the independent variables, showing that the independent variables were linearly independent for VIF equal to1 (less than 10). The results presented that all five environmental factors were positive and significantly related to satisfaction on the baseball stadium (Table 4). Jointly, the five environmental

Table 4: Regression analysis of the overall factors on satisfaction of stadium environment

Independent variable	*Coefficient â*	*t value*	*VIF*
Constant	3.95	190.46	
Environmental tidiness/ seat comfortableness	0.13***	6.18***	1.00
Space / sign design	0.20***	9.49***	1.00
Traffic convenience	0.19***	9.231***	1.00
Architectural aesthetic	0.10***	5.00***	1.00
Functions of scoreboards	0.20***	9.79***	1.00

1. R^2 = 44.4%, adjusted R^2 = 43.8%, F = 66.84.
2. *** represents significant level of 1 percent.

Table 3: ANOVA test of satisfaction by perception of physical environment clusters

Cluster	*Satisfaction*	*F value*	*p value*
Transportation accessibility and architectural aesthetic (I)	3.68	20.48***	<0.01
Total quality of overall surroundings (II)	4.23		
Stadium design and scoreboards (III)	3.96		
Scheffe post hoc test	I-II	II-III	I-III
Difference of the mean	-0.55***	0.27**	-0.28***

** and *** represent significance under the 5 percent and 1 percent significant levels, respectively.

factors predicted 44.4 percent of the variance in the baseball game.

To understand the respondents better and to meet the specific group needs at sport events, each cluster was broken down into various different socio-demographic characteristic groups. As shown in Table 5, all clusters exhibited significant differences in age and income, but were not found to have significant differences in gender and education.

Table 5: Characteristics of perception of physical environment clusters

Characteristics	*Cluster I*	*Cluster II*	*Cluster III*
Gender			
Male	27	66	49
Female	46	137	99
χ^2=0.5	p=0.78	df=2	
Age			
Under 18	1	12	14
19~24	16	39	58
25~29	24	61	38
30~34	18	50	24
35~39	9	11	5
40~44	3	18	5
45~49	1	7	1
Over 50	1	5	3
χ^2=38.11	p=0.00	df=14	
Education			
Under junior high school	1	5	8
Senior high school	10	44	20
Undergraduate	47	126	94
Graduate school	15	28	26
χ^2=9.02	p=0.17	df=6	
Month Income			
Under NT$20,000	18	55	64
NT$20,001~40,000	32	94	50
NT$40,001~60,000	19	40	22
NT$60,001~80,000	2	8	9
Over NT$ 80,000	2	6	3
χ^2=16.88	p=0.03	df=8	

Cluster I (convenience and architectural seekers): The majority of these spectators were between 19 and 29 years old (that is, 54.8% of the total in this cluster). Over sixty-four percent of spectators in this cluster had an undergraduate degree. In addition, forty-three percent of spectators reported their monthly income was between NT$20,001 and 40,000, while more than 67.6 percent of spectators had a monthly income less than NT$40,000.

Cluster II (total pursuit of quality): The majority of these spectators were between 24 and 34 years old (that is 54.7% of the total in this cluster), and the number of respondents who were over 35 years old in this cluster were more than the other two clusters. In addition, over forty-six percent of spectators reported their monthly income was between NT$20,001 and 40,000, while about twenty percent had a monthly income between NT$40,001 and 60,000.

Cluster III (stadium design and scoreboards): The majority of these spectators were between 19 and 29 years old (that is, 64.9% of the total in this cluster). In addition, 43.2 percent of spectators reported their monthly income was less than NT$20,000, while 33.8 percent had a monthly income between NT$20,001 and 40,000.

DISCUSSION

Spectators generally cared about the overall physical environment, including cleanliness, seating, sign and direction, traffic, construction, and updated scoreboard. A well-designed parking lot entrance and exit, signs for parking direction, and enough parking spaces, all help make spectators feel better when they are going to the game. However, if there is not enough parking area surrounding the venue, the manager should find extra parking space that is not too far away from the sports event and provide a shuttle service to reduce the travelling time and frustration of spectators. Availability, a well-designed entrance and exit, and well-trained staff for spreading traffic flow all enhance the enjoyment or decrease the frustration of spectators (Palmero and Price 2015; Uhrich and Benkenstein 2010, 2012).

The spectators were attracted to the baseball field construction and layout. Displaying multiple signs and banners, showing historical results, team records, and retired players on billboards, also help increase the attractiveness of the stadium. Ease of entrance into the stadium affects the perception of the audience, because if the entrance is too far away from one's seat or cannot cope with many spectators entering at one time, then the audience may leave the sports facility before the end of the game and reduce spectators' willingness to stay over the course of the event's time (Wakefield and Sloan 1995; Wakefield et al. 1996; Lambrecht et al. 2009). Furthermore, seat comfort (seating comfort) also has a part to play in the physical environment. Providing appropriate and comfortable seating is important, because it can increase employee productivity and satisfaction (Wakefield et al. 1996). Finally, the latest technology helps provide an-

other level of satisfaction for spectators through exciting replays, animated ads, and sports news with high quality audio and video on scoreboards (Mahoney and Tedrick 2014; Palmero and Price 2015; Wakefield et al. 1996).

Spectators contrastingly felt that a shortage of trash containers that the stadium manager should have added more trash facilities for usage. Venues need adequate trash facilities and must keep vigil at keeping them clean. This will help raise spectators' satisfaction with the stadium's cleanliness (Lambrecht et al. 2009).

The baseball field contains the geographical environment, physical space, space design and layout, furnishings, and other merchandise on display. In this paper, the detection of environmental quality for the baseball field's physical environment included the design and planning of the space outside the stadium and the audience's perceived quality and satisfaction towards the physical environment. Overall, the results suggested that the higher perceived quality of the stadium environment was associated with greater levels of spectators' satisfaction.

Based on cluster analysis, the spectators in Cluster I demanded some improvement in sign direction and clarification. The spectators in Cluster II have the highest satisfaction on the physical environment among various factors on average. The spectators in Cluster III are more focused on the visualization functions of the stadium itself.

From the demographic viewpoint, Cluster II has the highest income and educational level on average, and the respondents are relatively older than the other two clusters. Cluster III has the lowest income level on average and has relatively younger respondents than the other two clusters. In sum, the spectators in the 'total pursuit of quality' cluster had the highest education level on average compared to the other clusters. The spectators in Cluster I (convenience and architectural seekers) and Cluster III (stadium design and scoreboards) were relatively younger, had a lower income, and cared more about architectural aesthetics. Spectators in Cluster II were relatively older, had higher incomes, and felt traffic convenience was the most important factor.

The cluster findings overall indicated that the perception of the baseball stadium environment is an important component to fans. This suggests that the managers of the stadium should put forth more efforts to improve the quality of the stadium in order to attract potentially greater and more highly satisfied fans to baseball games. Thus, to maintain high satisfaction of the spectators, event directors and managers should pay close attention on specific groups in terms of a positive event image.

CONCLUSION

Taiwan hosted the 2010 ICBC, which attracted 53,356 spectators. This study extracted the main perceived quality of stadium environment through factor analysis, including five factorial dimensions, that is, 'environmental tidiness/seat comfortableness', 'space/sign design', 'traffic convenience', 'architectural aesthetic', and 'the functions of scoreboards'. All of them had a significant level of impact on the satisfaction of the respondents. A high environmental quality of the baseball field will increase the satisfaction of fans. Management should thus enhance the function of the facilities and improve traffic for the convenience of spectators.

In order to better explore the information about the characteristics of spectators, this paper implemented these five factorial dimensions and adopted cluster analysis to divide the fans into three clusters, that is, 'transportation accessibility and architectural aesthetic', 'total pursuit of quality', and 'stadium design and scoreboards'. 'Total pursuit of quality' was the most important market segment and had the highest mean score on satisfaction. The main demographic characteristics of this group are a higher education, 24 to 34 years old, and monthly income between NT$20,001 to NT$60,000. The managers of the stadium should create a proper marketing strategy to meet the needs of different audience groups, attracting those with different characteristics.

The results of this paper can be utilized for other types of sports facilities in order to fully understand the physical environment of a stadium and to provide high quality facilities to spectators so that they will have a very positive experience and come back to the stadium for a future event. Managers should plan accordingly in order to attract destination market fans from different market segments with effective marketing management strategies that will achieve maximum economic benefit.

RECOMMENDATIONS

This paper only focused on audience awareness of the physical environment of the stadium and their satisfaction. To analyze the costs and benefits of a sports event, future research can further estimate indirect use value, such as recreational benefits, the option value, and the non-use value of spectators on sporting events, which is defined in monetary terms within the concept of total economic value. Researchers not only can pay attention to spectators' psychological perceptions, but also look into the motives behind their awareness and satisfaction towards the physical environment. Doing so can help provide more information to countries holding major international sporting events as well as assist in the development of the sports industry.

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