Rapid Paper : Football (Soccer)

Influence of Spectator Density and Stadium Arrangement on Home Games in the J. League

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It is widely recognized that sports teams have a "home-team advantage". Despite its acknowledged importance, there is a lack of research on this phenomenon, specifically in the context of professional sports in Japan. The purpose of this study is to examine the influence of crowd density (the ratio of attendance to seating capacity) and spectator attendance (the total number of spectators attending home games in the current season) on home-team advantage in the J. League. The relationship between crowd density and home-team advantage was examined by an assessment of correlation coefficients. The relationship between team performance and stadium usage patterns was also investigated through a series of chi-square tests. Results showed that clubs which primarily use their main stadium for home games do not necessarily have a high crowd density, while other clubs have a higher level of crowd density by using several stadiums. In addition, the results indicate that crowd density has a weak effect on the home-team advantage. Based on the study findings, the findings, managerial implications and directions for future research are discussed.

Keywords: J. League, spectator density, stadium arrangement, home-team advantage

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1. Study background and objectives

According to Muto (2006), professional sports club stakeholders include shareholders, owners, employees, both Japanese and foreign players, chief coaches and other coaches, and other team staff. Arguing for a wider diversification, Hirose (2005) also classified stakeholders into six categories; namely, owners, competitors, fans, media, business (sponsors, MD, sales), and others (local governments, facilities).

There are several studies on stakeholders in various fields focusing on marketing as it involves community (McPherson, 1976; Kolbe and James, 2001; Wann et al., 2001; Matsuno, 2003; Ono, 2007), team royalties (Wakefield and Sloan, 1995; Fujimoto et al., 1996), and commitment (Mahony et al., 2000). Stakeholders attend stadium games expecting their team to win. According to studies on such stakeholders, an important stakeholder segment is the fan. Admission is one of the major sources of income for professional sports clubs. As clubs create stronger teams, their fan base expands. Such expansion, in turn, contributes to increased sales of team-related products, creating a synergetic effect for clubs. In addition, the development of a stronger team means potential for movement to higher standing, which contributes to stronger media interest and increased sponsor revenue. For these reasons, professional sports clubs place a priority on increasing their chances of winning. Home game victories, in particular, exert a significant influence on the fan base and serve to benefit clubs. This study focuses on fan base and the home field advantage.

The standard definition of home-field advantage is provided by Schwartz and Barsky (1977). According to Schwartz and Barsky, the home-field advantage refers to the consistency with which home teams win over 50% of all the games won in organized sports leagues based on league competition. This study adopts the Schwartz-Barsky definition of "home-field advantage."

Schwartz and Barskey (1977) examined the home-field advantage in four major sports in the United States; namely, Major League baseball, American football, ice hockey, and basketball. As a result, they identified the home-field advantage in all four leagues: 53% in baseball, 58% in American football,

and 64% in ice hockey and basketball. They pointed out three major factors involved in producing the home-field advantage; learning/familiarity, travel, and crowds. Courneya et al. (1992) pointed out the same factors and added another; namely, rules.

In regard to the learning/familiarity factor, Pollard (1986) argued that no home-field advantage was present in soccer when considered from the viewpoint of pitch size, or turf type; namely, artificial or natural. Schwartz and Barsky (1977) argued that because sports played on standardized fields included an obvious home field-type advantage for both teams, the home-field advantage in such sports was nullified. Pollard (1986) argued against the importance of travel as a factor. Agnew and Carron (1994) analyzed the impact of crowd density on home-field advantage in ice hockey games. They concluded that an increase in crown density had a positive effect on the home-field advantage, whereas spectator number did not.

Meanwhile, Pollard (1986) argued that there was no difference in home-field advantage among England's premium league divisions related to crowd density. Courneya and Carron (1992) also suggested that absolute spectator number was not an important factor. Harada et al. (1996) examined the impact of spectator number and crowd density on home-field advantage in Japan, and reported finding no correlation between the home-field advantage and crowd (spectator number, crowd density) in professional baseball and soccer leagues. As mentioned above, these previous studies both at home and abroad seem to have examined sports in the same way. However, cultures differ and each sport has its unique characteristics; therefore, a limitation of many of the above-mentioned studies is their failure to examine all of factors related to the home-field advantage. Therefore, in this study, I focus on professional soccer, which has a relatively short history in Japan.

Recently, it has been suggested that ranking within J-League Division 1 (J1) does not influence spectator number, whereas regional service activities do. If the team is in J1, the rank is not of significant importance. However, it is highly likely that demotion to J-League Division 2 (J2) would significantly lower spectator number. Therefore, it is suggested that maintaining a position in J1 is of importance for teams (Matsubashi and Kaneko, 2007).

Karl and Ron (2004) referred to five classifications in the service industry[1] and changes in the basic thinking about services that have widened the range of activities included in the service industry and related businesses. As a professional sports organization the J. League is considered a service industry under these five classifications. The J. League is a new model within the service industry, one that is required to consider its supporters as a customer base and the importance of games[2] as a product. Westerbeek and Smith (2003) stated that a stadium with empty seats has a bad influence on stakeholders while a packed stadium makes the game attractive. The winning rates at packed home games are higher, and this contributes to the sustainable competitive advantage of the team. Acquiring a sustainable competitive advantage means that winning games contributes to increased profitability and stable financial management.

There are few studies on the relation between crowd density and home-field win/loss rates, highlighting the need to examine this aspect of J. League performance. With its relatively short history, however, few teams actually own stadiums. Indeed, many teams use stadiums managed by local governments, requiring teams to coordinate with the local authorities. Because of this, home games can be different for each J-League team. Unfortunately, existing studies have not considered stadium arrangements as a factor. Therefore, this study was carried out to examine the association between crowd density and scores while considering the influence of stadium arrangements.

2. Study methods

2.1. Survey data

Data obtained from games played between FY 2002 and 2006 were used (J-League, 2006). The period of the survey data used for this study was based on a previous study on the home-field advantage in sports in the U.S. and Europe carried out by Harada (1996). Many previous studies focused on data from one to three seasons, with the number of subject games in most cases totaling less than 1,000. Considering these facts, this study set the period at five years, which yielded the largest amount of the data, on the assumption that the data are as reliable as those in the previous studies.

2.2. Term definition

(1) Performance

Agnew and Carron (1994) and Smith (2003) measured the home-field advantage using the home-game win rate (number of games one/ number of home games played). Using this method, Harada et al. (1996) analyzed the performance of Japanese professional baseball and J. League teams. However, Harada et al. (1996) excluded home games played at stadiums other than home stadiums and tie games. This may be because data collection and processing was extremely complicated, required the matching of conditions to maintain the consistency of data between the professional baseball and J-League teams. However, those two sports have different attractions. For example, tie games are one of the attractions of soccer. Therefore, it is necessary to carefully discuss tie games.

I carefully examined the most appropriate index for competitive performance. Meanwhile, Uchida and Hirata (2008) interpreted competitive performance utilizing the final performance of the season for ranking in addition to the above-mentioned previous studies. In other words, they used the final ranking in the league games of the season and analyzed them. However, the purpose of this study was to examine the correlation among J-League team crowd density, stadium arrangements for home games, and competitive performance. Therefore, it was not appropriate to use the ranking of the seasons as an indicator of competitive performance. While it is probably the most adequate indicator of comprehensive competitive performance of the team, it does not always mean that good ranking equals a good home-game win rate.

Because of the above, I used the total scores of winning games at home stadiums during the season as the indicator of competitive performance in this study. In league games, there are tie games in addition to wins and losses, making cumulative scores of wins at home stadiums the most appropriate. The subject games of this study were 2,700 games between 2002 and 2006 (1,332 J1 games and 1,368 J2 games).

Home-field advantage in previous studies and competitive performance in this study were also described to clarify the characteristics of this study. The explanatory variables used in this study are crowd density and spectator attendance. The purpose of this study is not to discover major factors that exert a direct influence on the home-field advantage. This study was not carried out to clarify the causal association, such as whether teams win games because crowds gather, or if crowds gather because teams win games. The purpose of this study was, rather, to examine the association among the competitive performance, crowd density and spectator attendance; therefore, I used the term, "competitive performance" rather than "home-field advantage."

(2) Spectators at stadiums

This study was carried out for the purpose of examining the association between the home games and spectators at stadiums. I first carefully examined how best to define spectators at stadiums. Data on spectators at stadiums was provided by J-League; however, the amount of information was large and required screening for the most relevant data.

Spectators at stadiums in professional sports games including J-League mean spectator attendance at each game. However, spectator attendance is not sufficient in the consideration of crowd density due to the difference in capacities of the home stadiums for each team. **Table 1** shows that the home-game stadiums for each team are different. Therefore, I considered it necessary to covert the J-League data into a form that allows us to virtually understand crowd density. The spectator attendance at the relevant home game against the capacity of the stadium was defined as crowd density.

Meanwhile, it is also important for profitable business management to attract more spectators to the home stadium over the long term. In regard to the team management, the cumulative number of spectators at home games is important in creating promotional strategies for the achievement of spectator target numbers and in establishing advantageous relations with team sponsors.

Therefore, the total number of spectators attending home games in the current season was defined as "spectator attendance" for the analysis of the data using the "crowd density" and "spectator attendance."

(3) Classification of the stadium arrangements for home games

Not all the home games are held at specific home stadiums. Many home games are held at other stadiums (**Table 1**). If all teams had their own home stadiums for home games, it would be possible to apply the processes described above. However, facilities for J-League games cost a tremendous amount of money to build even with cooperation

Table 1 Current Status of the Rate of Holding Games at the Stadiums and Crowd Density of 31 Teams of J-League in 2006

	Stadium Name	Capacity	Rate of Holding Games	Crowd Density
Kashima	Kashima Soccer Stadium	39026	100.0%	39.5
Hiroshima	Hiroshima Big Arch	50000	100.0%	22.4
Fukuoka	Level-5 Stadium (Hakatanomori Stadium at East Hirao Park)	22563	100.0%	61.1
Oita	Kyushu Oil Dome	40000	100.0%	50.9
Chiba	Fukuda Electric Alina	18500	100.0%	72.4
Kawasaki F	Todoroki Athletics Stadium	25000	100.0%	57.4
Niigata	Tohoku Electdric Big Swan Stadium (Niigata Stadium)	42300	100.0%	91.5
Kyoto	Nishikyogoku Athletic Stadium at the Field, Track, and Ball Game Field	20242	100.0%	48.3
Kofu	Kose Sports Park Atheltic Stadium (Yamanashi)	17000	94.1%	71.0
	Matsumotodaira Wide Area Park General Stadium (Alwin)	20000	5.9%	73.0
G Osaka	Osaka Expo '70 Stadium	21000	94.1%	77.7
	Western Green Park Atheltic Stadium (Ishikawa)	21068	5.9%	72.8
Urawa	Saitama Stadium 2002	63700	88.2%	77.8
	Saitama City Urawa Komaba Stadium	21500	11.8%	76.7
Yokohama FM	Nissan Stadium	72327	88.2%	34.9
	Nippatsu Mitsuzawa Stadium	15046	11.8%	79.8
FC Tokyo	Ajinomoto Stadium	50000	82.4%	50.4
	Matsumotodaira Wide Area Park General Stadium (Alwin)	20000	5.9%	85.4
	National Olympic Stadium	50339	11.8%	39.3
Shimizu	Outsourcing Stadium Nihondaira	20339	82.4%	61.1
	Ecopa Stadium (Shizuoka Prefectural Ogasayama Sports Park Stadium)	50889	11.8%	47.5
	National Olympic Stadium	50339	5.9%	41.3
Iwata	Ecopa Stadium (Shizuoka Prefectural Ogasayama Sports Park Stadium)	50889	29.4%	60.6
	Yamaha Stadium (Iwata)	16893	70.6%	75.0
Nagoya	Nagoya City Mizuho Park Athletic Stadium	27000	70.6%	43.0
	Toyota Stadium	43000	29.4%	53.2
C Osaka	Osaka Nagai Stadium	50000	70.6%	30.1
	Osaka Nagai Aid Stadium (Second Nagai Stadium)	15000	29.4%	54.4
Omiya	Saitama Stadium 2002	63700	29.4%	24.8
	Saitama City Urawa Komaba Stadium	21500	58.8%	36.6
	Kumagaya Sports and Culture Park Athletic Stadium	15400	11.8%	53.1

	Stadium Name	Capacity	Rate of Holding Games	Crowd Density
Sendai	Yurtec Stadium Sendai	19694	100.0%	76.0
Yamagata	ND Soft Stadium Yamagata (Yamagata Prefectural General Sports Park)	20315	100.0%	24.6
Shonan	Hiratsuka Atheltics Stadium	18500	100.0%	30.1
Ehime	Ningineer Stadium (Ehime Prefectural Sports Complex Stadium)	21585	100.0%	18.6
Tokushima	Naruto Otsuka Sports (Pocari Sweat) Stadium	20441	95.8%	17.4
	Kochi Prefectural haruno Athletic Stadium	25000	4.2%	13.3
Mito	Kasamatsu Athletic Stadium	22022	91.7%	14.2
	Hitachinaka City Athletic Stadium	15000	4.2%	8.6
	Mito City Athletic Stadium	5000	4.2%	45.5
Kusatsu	Gunma Prefectural Shikishima Park Stadium	10050	91.7%	37.4
	Matsumotodaira Wide Area Park General Stadium (Alwin)	20000	4.2%	14.3
	Kumagaya Sports and Culture Park Athletic Stadium	15400	4.2%	26.1
Tosu	Best Amenity Stadium (Tosu Stadium)	24490	91.7%	30.9
	Saga Prefectural Athletics Stadium	17000	8.3%	36.8
Kashiwa	Hitachi Kashiwa Soccer Stadium	15900	87.5%	51.1
	Kshiwanoha Stadium	20000	12.5%	48.9
Yokohama FC	Nippatsu Mitsuzawa Stadium	15046	87.5%	31.8
	Nissan Stadium	72370	4.2%	15.2
	National Olympic Stadium	50339	8.3%	11.3
Kobe	Home's Stadium Kobe (Misaki Park Stadium)	34000	87.5%	20.7
	Kobe Universiade Memorial Stadium	45000	8.3%	14.6
	Hyogo Miki General Disaster Prevention Park Stadium	20000	4.2%	24.1
Sapporo	Sapporo Dome	41580	45.8%	34.2
	Muroran Irie Sports Park Stadium	12600	4.2%	40.2
	Hakodate Chiyogadai Park Stadium	15000	4.2%	44.1
	Sapporo Atsubetsu Park Stadium	20005	45.8%	37.9
Tokyo V	National Olympic Stadium	50339	37.5%	11.7
	Komazawa Olympic Park Stadium	20000	4.2%	21.0
	Ajinomoto Stadium	50000	45.8%	12.3
	National Nishigaoka Soccer Stadium	9038	12.5%	43.7

Note) Capacity of each stadium is obtained from their websites.

from the municipal government. Therefore, not all the teams can have their own stadiums, a circumstance that results in teams having to use several stadiums as their home stadiums (**Table 1**).

In this study, location of games for all 31 teams was classified to allow a deeper analysis of the correlation among competitive performance, crowd density, and spectator attendance. Data obtained in 2006 was used for the analysis. According to **Table 1**, teams that played all games at stadiums used exclusively throughout the season were categorized into a "fixed" group. Teams that played games at two stadiums, a main and a sub stadium, were categorized into a "concurrent" group. Teams that played games at three or more stadiums were categorized into a "fluctuating" group.

Naturally, there is room for discussion regarding the appropriateness of considering home games held at stadiums other than home stadiums to be the same as home games held at a team's main stadium. However, as mentioned above, there are some teams that play home games in locations other than their home towns. In such cases, it would be inappropriate to consider both sides as away teams. In addition, "concurrent" and "fluctuating" groups had the same rate of home games played at several stadiums; and some other teams in the groups revealed different but quite similar rates of home games played at several stadiums, making it impossible to specify which stadium was the main stadium for each team. Therefore, in this study, the stadiums at which teams played what they considered home games were defined as home stadiums.

2.3. Statistical analysis

For analysis of the correlation between competitive performance and spectator attendance, this study applied Pearson's correlation with two variables. For analysis of the home stadium arrangements and competitive performance, J1 and J2 league data were subjected to χ^2-test. Statistical significance was set at less than 5%. SPSS for Windows 15.0.1J was used for all analyses.

3. Results and discussion

3.1. J-League team home stadiums

In regard to the upper division teams in the British Premium League and U.S. Notional Hockey League (NHL), which are major professional sports leagues, spectator attendance regularly exceeds stadium capacity, usually reaching more than 100% (Westerbeek and Smith, 2003). Data on spectator attendance as a function of stadium capacity at Japanese professional baseball games shows the Yomiuri Giants to be 116%, the Fukuoka Softbank Hawks to be 94.6%, the Hanshin Tigers to be 87.5%, and the Chunichi Dragons to be 80.36%, which are high attendance rates; however, there are many other teams that showed spectator attendance to be less than 50% of stadium capacity (Ono, 2004).

Due to the lack of reports regarding J-League game attendance, I show the data collected in this study in **Figure 1** According to **Figure 1**, J1 League crowd density was approximately 55%, and J2 League crowd density was approximately 35%. **Table 1** shows crowd density for each team in 2006. According to **Table 1**, there are 12 teams that have "fixed" home stadiums and 19 teams that have "concurrent" or "fluctuating" stadiums. **Table 1** shows that the teams with "fixed" stadiums did not always show higher crowd density; however, some teams with "concurrent" or "fluctuating" stadiums showed higher crowd density. **Table 1** also shows that capacity did not exert a direct impact on crowd density. Unfortunately, spectator attendance using quantitative variables could not be shown in **Table 1** due to data processing issues.

Based on the data of home stadiums, the correlations among competitive performance, crowd density, and spectator attendance, the objective of this study, was clarified in this study.

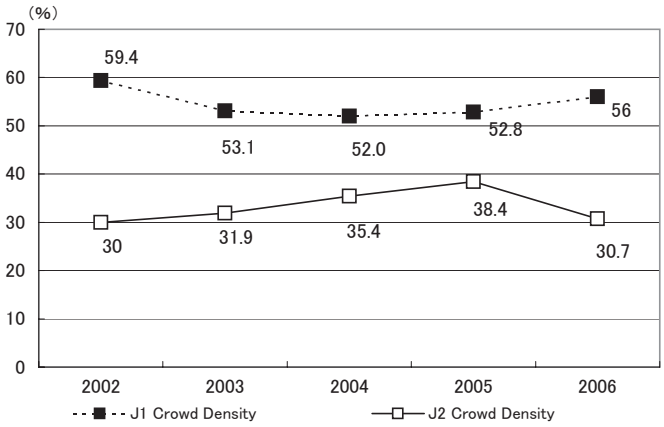

Figure 1 Changes in Crowd Density by J-League Division

Source: Created by the author based on the J-League Spectator data

3.2. Analysis of the correlation between competitive performance and variables

Table 2 shows the correlation among competitive performance, crowd density, and spectator attendance. For the league overall, both crowd density and spectator attendance showed a statistically significant positive correlation with competitive performance. As a result, both crowd density and spectator attendance were considered to correlate with competitive performance at home games. In the J1 League, in particular, crowd density alone reached statistical significance, and competitive performance showed stronger correlation with crowd density than with spectator attendance. This showed the importance of reducing empty seats at home stadium games, which increases the importance of stadium capacity for home games.

In the J2 League, variables of both crowd density and spectator attendance showed a highly positive correlation. Spectator attendance also showed a strong correlation with competitive performance, which shows that acquisition of more spectators at home games is important regardless of stadium capacity. The correlation with stadium spectators in the J2 League may be a function of having fewer away-team spectators at home games, compared with J1 League. In other words, most spectators at J2 stadium games are home-team supporters considered to have an impact on the competitive performance. However, this study applies only two variables for a focus on correlation rather than impact. Further discussion will be left as a future issue.

3.3. Examination of stadium arrangements and competitive performance at home games

The above results show a correlation between crowd density and competitive performance in the league overall or by division. Crowd density and stadium capacity are important factors in stadium strategy for home games.

Table 3 shows the correlation between competitive performance and three stadium arrangement groups in 2,700 subject games subjected to χ^2-test. There was a correlation between stadium arrangements and competitive performance in the J1 and overall league; however, no correlation was revealed in the J2 League. Among the three arrangement groups, the win rate of the "concurrent" group was high. The win

Table 2 Correlation among Competitive Performance, Crowd Density, and Spectator Attendance

	Crowd Density	Spectator Attendance	Average of Attendance
Competitive Performance throughout J-League	0.252 **	0.304 **	0.247 **
Competitive Performance in J1	0.240 *	0.145 n.s.	0.277 **
Competitive Performance in J2	0.398 **	0.582 **	0.476 **

Note)* $p < 0.05$ ** $p < 0.001$ n.s.=non.significant

Table 3 Correlation of Competitive Performance and the Stadium Conditions at Home Games in J-League

Throughout J-League					J1					J2				
	Win	Tie	Loss	X^2Value Significance Level		Win	Tie	Loss	X^2Value Significance Level		Win	Tie	Loss	X^2Value Significance Level
Fixed	296	169	206	12.57	Fixed	133	75	103	13.26	Fixed	163	94	103	6.21
Concurrent	565	299	368	*	Concurrent	341	165	214	*	Concurrent	224	134	154	n.s.
Fluctuating	315	189	293		Fluctuating	127	52	122		Fluctuating	188	137	171	
Total	1176	657	867		Total	601	292	439		Total	575	365	428	

Note 1) Figures show the number of games. Note 2)* $p < 0.05$ n.s.=non.significant

rate of the "concurrent" group in the J1 and overall league was 70% or more, and the win rate at home games was also high. These rates were also higher in comparison with those examined by Harada et al. (1996).

Figure 1 above shows the change in crowd density by J-League division, revealing approximately 55% in the J1 League and 30% in the J2 League, which shows that J1 League crowd density was high. There was a significant difference in crowd density between the J1 and J2 Leagues, showing the need for analysis by divisions.

Tables 4 and **5** show the results for each division. The J1 League reference value, which shows a slightly increasing tendency from the average crowd density for each division, was set at 60% and the J2 League reference value, which shows a decreasing tendency, was set at 30%.

As a result, in the J1 League, the "concurrent" group, with 60% or more crowd density that showed statistical significance, revealed higher competitive performance than the two other groups. In the J2 League, the "concurrent" group, with 30% or more crowd density, revealed higher competitive performance than the two other groups. It is a key point that the "concurrent" group showed a significant difference in this study. The reasons why the "concurrent" group showed a higher value than the two other groups is described below.

The "concurrent" group was able to arrange schedules in advance, which is significant because the ability to select the stadium makes it possible to increase crowd density for an advantage in home games against specific opponents. As **Table 6** makes clear, the "concurrent" group showed an overwhelming advantage in competitive performance not only in the J1 League, but also in the J2 League, although a correlation with crowd density was

Table 4 Correlation between Competitive Performance and Crowd Density at Home Games in J1

J1 : Crowd Density at 60% or more					J2 : Crowd Density at less than 60%				
	Win	Tie	Loss	X^2Value Significance Level		Win	Tie	Loss	X^2Value Significance Level
Fixed	32	21	42	12.57 *	Fixed	101	54	61	9.38 n.s.
Concurrent	164	63	89		Concurrent	177	102	125	
Fluctuating	29	18	42		Fluctuating	98	34	80	
Total	225	102	173		Total	376	190	266	

Note 1) Figures show the number of games.

Note 2) ** $p < 0.05$ n.s.=non.significant

Table 5 Correlation between Competitive Performance and Crowd Density at Home Games in J2

J1 : Crowd Density at 30% or more					J2 : Crowd Density at less than 30%				
	Win	Tie	Loss	X^2Value Significance Level		Win	Tie	Loss	X^2Value Significance Level
Fixed	64	29	37	21.99 **	Fixed	99	65	66	5.43 n.s.
Concurrent	130	62	58		Concurrent	94	72	96	
Fluctuating	83	61	98		Fluctuating	105	76	73	
Total	277	152	193		Total	298	213	235	

Note 1) Figures show the number of games.
Note 2) ** $p < 0.05$ n.s.=non.significant

Table 6 Correlation between Competitive Performance and Stadium Arrangements at Home Games in J-League

		J1						J2				
		Win	Tie	Loss	X^2Value Significance Level			Win	Tie	Loss	X^2Value Significance Level
Fixed	60% of more	32	21	42	7.37 *	Fixed	30% or more	64	29	37	1.83 n.s.
Fixed	Less than 60%	101	54	61		Fixed	Les than 30%	99	65	66	
Concurrent	60% of more	164	63	89	5.09 n.s.	Concurrent	30% or more	130	62	58	15.64 **
Concurrent	Less than 60%	177	102	125		Concurrent	Les than 30%	94	72	96	
Fluctuating	60% of more	29	18	42	4.78 n.s.	Fluctuating	30% or more	83	61	98	7.59 *
Fluctuating	Less than 60%	98	34	80		Fluctuating	Les than 30%	105	76	73	
Total		474	240	317		Total		387	228	257	

Note 1) Figures are the number of games.

Note 2)** P < 0.05 , n.s.=non.significant

observed in the J2 League. Of course, the "fixed" and "fluctuating" groups also showed a home-field advantage, which, however, was lower compared with that of the "concurrent" group. Among the home games held by the "concurrent group" with crowd density high at 30% or more in J2 League, they won 192 out of 250 games (approx. 77%). As shown above, competitive performance at "concurrent" group home games was higher than the two other groups, which may be a function of the home advantage, which only occurs in the concurrent use of stadiums.

4. Conclusion

The objective of this study was to examine the correlation between J-League stadium arrangements for home games and competitive performance.

This study also clarified the following points:

(1) As was suggested in previous studies, the correlation between crowd density of J-League teams and the competitive performance at their home games was confirmed;

(2) The "concurrent" group showed a high correlation with competitive performance; and

(3) Home games with high crowd density did not always correlate with competitive performance.

This study confirmed the importance of spectators as stakeholders for team management. Consistent with the findings of Hirose (2005) and Ono (2007), the results of this study support the importance of prioritizing supporters as well as viewing customers as resources and stakeholders. Furthermore, discussing the crowd density from the perspective of stadium arrangements as well as the home-field advantage discussed in many previous studies provided a new viewpoint.

We cannot ignore the mutual relationship among diversified stakeholders when examining the sports industry. A limitation of this study was that the variables measured to clarify the correlations with competitive performance were limited to crowd density and spectator attendance, which prevented the discussion from including impact. In order to discuss impact, it is necessary to carry out a careful and detailed examination with additional variables in reference to previous studies using hierarchical regression analyses. This study was limited to stadium arrangements, which represents a new viewpoint. It did not, however, adopt an analysis device to measure impact.

In addition, it is necessary to examine reproducibility using ranking, which is one of the indexes of competitive performance, and carry out comparative studies with professional sports other than J-League soccer.

Notes:

1) Service industries here mean all service businesses, including the fourth industry (intelligent services) (Bart Van Looy et al. 2004).

2) It was classified into five groups, human resource services without reference to skill, services based on proficiency, services for industries, services for the general public, and services in advanced technology. All classifications are simply service resources, which do not require cooperative relationships in product provision or processes.

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