

CLASSIFICATION OF TENNIS CENTRES WITH REGARD TO CONDITIONS AND MODELS OF OFFER

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Abstract:

By means of cluster analysis carried out on K groups applied to 16 tennis centres statistically, significant differences were established on the basis of the analysis of variance. The characteristics, on the basis of which the basic parameters of their functioning and further development within the offer on the one hand, and the profitability on the other may be anticipated, were established for three hypothetical models of tennis centres. The analysis of the types of tennis centres makes it possible to set the criteria for the construction of an optimal-quality tennis centre that would comprise in its offer the necessary contents and which would function positively in terms of profit.

Key words: sports recreation, tennis centre, offer contents, profitability

DIE KLASSIFIKATION DER TENNISZENTREN NACH DEN BEDINGUNGEN UND DEM ANGEBOT

Zusammenfassung:

Mittels einer auf den K-Gruppen ausgeführten und an 16 Tenniszentren angewandten Clusteranalyse wurden einige statistisch bedeutende Unterschiede auf Grund der Varianzanalyse gefunden. Für drei hypothetische Modelle der Tenniszentren wurden diejenigen Eigenschaften bestimmt, die als Grundparameter ihres zukünftigen profitablen Funktionierens sowie der Erweiterung ihres Angebots antizipiert werden könnten. Die Analyse der Typen von Tenniszentren ermöglicht es, Kriterien für die Bildung eines Tenniszentrums optimaler Qualität zu setzen, dessen Angebot die erforderlichen Inhalte hätte, das aber auch profitabel arbeiten würde.

Schlüsselwörter: Freizeitsport, Tenniszentrum, Angebot, Profitabilität

Introduction

Tennis, as an extremely attractive sports activity, gathers athletes and the people who are engaged in it on a recreational basis of different age categories, from pre-school age to the elderly. According to previous research, people who play tennis on a regular basis are more physically fit (Vodaka et al., 1980). Likewise, these people acquire a positive emotional experience (Love, 1991). The different age categories and different motives for participation in tennis require a combination of various sport contents and an offer of accompanying services.

Owing to the climatic conditions in the Split area tennis may be played on outdoor courts throughout the year. The number of users of tennis centres was about 2,000 which, taking into account the number of tennis

centres (60), points to a significant degree of utilization of these centres. The tennis centres in Split are mostly used by people who are engaged in tennis on recreational basis (about 1,000), tennis schools participants (about 400), competitors (about 300) and those who participate in training on an individual basis (about 240). The number of people who participate in tennis on a recreational basis is constantly on the rise, which is in congruence with the desire to increase the total number of these people (users on a recreational basis) in Croatia, since their number is, at the moment, significantly smaller in comparison to the number of people who play tennis recreationally in developed countries (Relac, 1998). In contrast to the situation in some countries, for example, Switzerland, Denmark or Sweden where the share of recreation-based tennis participants is 20% of the total number of inhabitants, in Croatia only about

5% of the total number of inhabitants play tennis recreationally.

Each tennis centre offers sports programs (contents) and the accompanying services according to planned organizational goals, but also according to the potentials of a sports facility (for example, a decrepit facility or a lack of its adaptation to the users). In order to develop recreation in Croatia a planned construction of recreation centres, which would among other things contain tennis courts as well, is necessary (Andrijašević, 1998).

The goal of this research was to classify tennis centres and to establish their characteristics with regard to the model of offer. The classification analysis showed the existing situation and gave answers to the question whether the offer of tennis centres is in congruence with the needs and prospects of the users of tennis courts. By calculating the degree of utilization of the capacities of each tennis centre the organizational and the economic successfulness of the existing models of tennis offer were established.

Methods

The entity sample

The entity sample was comprised of 16 tennis centres whose characteristics were expressed through three different taxonomy groups differentiated according to their specifics (number and types of courts, types of services, utilization of capacities, etc.).

The sample of variables

To classify the tennis centres 20 numerical and 10 nonnumerical variables obtained by means of a questionnaire were established.

The first group of numerical variables was determined according to the number of particular categories of users. The categories of users were established according to the age and the motive for tennis participation. The tennis school participants are *children* 1.

(KRSKDJ) and *adults* 2. (KRSKOD). The users of the tennis courts on an individual-training basis (one coach and one player are on a court) are also *children* 3. (KRINDJ) and *adults* 4. (KRINOD). Recreation-based tennis is played by *children* 5. (KRREKDJ) and *adults* 6. (KRREKOD). People who are in for competitive tennis make up a separate category, namely, *the competitors* 7. (KRNAT).

The next group of variables was established according to the number of *clay courts* 8. (TERENZ), the number of *hard courts* 9. (TERENT) and the number of *floodlit tennis courts* 10. (TERENR).

The daily utilization degree of the tennis courts was obtained by the number of hours played on a court. The variables of the daily utilization of particular types of tennis courts were obtained for the summer period (11. ISKZ - *clay court*, 12. ISKT - *hard court*, 13. IKSR - *the floodlit court*) and for the winter period (14. ISKZ2 - *clay court*, 15. ISKT2 - *hard court*, 16. IKSR2 - *the floodlit court*).

Further, the variables were established according to the price of *renting the court per hour per day* 17. (CJSAT) and the price of *renting the floodlit court per hour per day* 18. (CJRASV).

According to the number of employed personnel in particular tennis centres two variables were established: *the coaches who were employed on a full-time basis* 19. (KADTRST) and *other personnel employed on a full-time basis* 20. (KADZAPO).

The last group of variables was comprised of nonnumerical variables determined according to the existence of particular services and contents offered by tennis centres. The affirmative answer was marked by 1, and the negative by 2. These variables were: does a tennis centre organize annual competitive (TURNIR) and recreation-based (TUREK) tournaments? Does a tennis centre offer the service of racket maintenance (SERV), the possibility of using a gym (TERTN) and the utilization of catering services (UGOST)? Are there any club premises for the users of the tennis courts (KLUB)? Is there a bathroom facility that offers the possibility of taking a shower (TUS)? Is there a parking lot in the tennis

centre (PARK)? Are there any audience stands (TRB)? Does the tennis centre apply marketing principles for the improvement of its business transactions (MARK)?

Data processing methods

The cluster analysis on K groups was used to process the data. Three groups, that is, three types of tennis centres were established in advance for the purpose of this analysis. The mean values of the numerical and the mode values of the nonnumerical variables were calculated and presented for the obtained clusters.

By means of the method of cluster analysis on K groups the analysis of variance was carried out. Thus statistically significant differences between the obtained groups of taxons were established. The obtained classification of tennis centres makes it possible to rank the types of centres according to their quality.

Further, the degrees of capacities' utilization of different types of tennis centres were calculated and graphically presented.

Table 1: Arithmetic means of numerical variables according to clusters

	K-1	K-2	K-3
	AM	AM	AM
KRSKDJ	12.3	46.0	22.4
KRSKOD	3.6	2.5	6.0
KRINDJ	10.1	20.5	8.3
KRINOD	5.7	4.0	3.1
KRREKDJ	18.9	0.0	4.9
KRREKOD	51.4	135.0	41.1
KRNAT	2.3	97.5	14.4
TERENZ	1.1	7.0	2.6
TERENT	1.7	2.0	0.3
TERENR	1.0	8.5	2.1
ISKZ	3.9	9.5	6.6
ISKT	4.4	6.0	0.4
ISKR	0.9	2.0	1.9
ISKZ2	2.9	7.0	5.1
ISKT2	3.6	6.0	0.4
ISKR2	0.9	3.5	2.9
CJSAT	15.0	27.0	30.0
CJRASV	6.4	40.0	39.3
KADTRST	0.7	6.5	2.0
KADZAPO	0.7	3.0	1.3

The data were processed by means of a statistical package Statistica for Windows, Version 4.5.

Results

The sample of 16 tennis centres was grouped by means of cluster analysis into three hypothetical clusters in order to establish how they differed from one another. The three obtained types of tennis centres differed according to the type of court, according to the number of tennis courts and according to the supplementary contents. On the basis of these differences the recognizable characteristics of each type of tennis centre should help create the criteria for the construction of these centres with regard to quality and the expected economic profitability. According to mean values (Table 1) the tennis centres with a large number of tennis courts (cluster K2) attract mostly young competitors from the Split area. Together with the offer of the accompanying services and contents (Table 2), a larger number of people are employed, which consequently leads to a high degree of utilization of the courts. The other clusters - K1 and K3 - are comprised of seven tennis centres. The members of K1 cluster have, on average, more hard courts and a very small average number of floodlit courts. In these poorly equipped centres with very few accompanying services an almost complete lack of personnel employed is understandable. The tennis centres that belong to the K3 cluster mostly contain clay courts which are usually floodlit. The

Table 2: Mode values of nonnumerical variables according to clusters.

	K-1	K-2	K-3
	Mod	Mod	Mod
TURNIR	2	1	2
TUREK	2	1	1
SERV	2	1	1
UGOST	2	1	1
TERTN	2	1	2
TUS	2	1	1
TRB	2	1	2
PARK	1	1	1
KLUB	2	1	1
MARK	2	1	2

employed coaches and other personnel take care of the service for the different contents and accompanying services.

The analysis of variance is presented in the three tables according to the pairs of K clusters in order to establish the significant differences between each two possible types of tennis centres.

The K2 type of a big tennis centre is statistically significantly different from the K1 type of a smaller tennis centre, which predominantly contains hard courts (Table 3), primarily according to the number of clay courts (TERENZ) and the number of courts equipped by flood lighting (TERENR). From this, the difference in the number of adult people who are engaged in this sport on a recreational basis (KRREKOD) and in the number of young competitors (KRNAT) is derived. Because of the poor playing conditions, the price of renting the floodlit courts (CJRASV) in tennis centres of the type K1 is significantly lower than the price of renting the courts in big K2 tennis centres. The utilization of floodlit tennis courts is also significantly lower in winter (ISKR2), when, as a rule, tennis is played more frequently under floodlights than in summer. A statistically significant difference between these two types of tennis centres as regards the number of coaches employed (KADTRST) and other personnel (KADZAPO) is completely understandable.

Table 3: Analysis of variance between clusters K1 and K2 ($p > 0.05$).

Variables:	df	F	p
KRREKOD	7	29.99	0.00
KRNAT	7	404.69	0.00
TERENZ	7	42.18	0.00
TERENR	7	58.33	0.00
ISKR2	7	10.34	0.01
CJRASV	7	16.68	0.00
KADTRST	7	45.97	0.00
KADZAPO	7	7.66	0.03

A significant difference in the variables TERENZ and TERENT between a big tennis centre of type K2 and a tennis centre of type K3 (Table 4) describes the latter one as the type with a smaller number of courts which are almost exclusively clay courts. The smaller

number of courts results in a significantly smaller number of courts equipped by flood lighting (TERENR), and in a smaller number of adult people who participate in tennis on a recreational basis (KRREKOD), a smaller number of competitors (KRNAT), a smaller number of children who participate in the so-called individual training sessions (KRINDJ) and in a smaller number of coaches and other personnel employed (KADTRST, KADZAPO). Hard courts are a part of the facilities in a big tennis centre of type K2 and have a significantly higher degree of utilization both in summer (ISKT) and in winter (ISKT2). On the contrary, the degree of utilization of hard courts in a smaller tennis centre of type K3 is zero.

Table 4: Analysis of the variance between the clusters K2 and K3 ($p > 0.05$).

Variables:	df	F	p
KRINDJ	7	12.12	0.01
KRREKOD	7	36.54	0.00
KRNAT	7	27.77	0.00
TERENZ	7	15.57	0.00
TERENT	7	9.33	0.02
TERENR	7	20.60	0.00
ISKT	7	43.81	0.00
ISKT2	7	43.81	0.00
KADTRST	7	9.00	0.02
KADZAPO	7	22.40	0.00

Table 5: Analysis of the variance between the clusters K1 and K3 ($p > 0.05$).

Variables:	df	F	p
KRREKDJ	12	5.20	0.04
TERENT	12	6.66	0.02
ISKT	12	9.68	0.01
ISKT2	12	6.54	0.02
ISKR2	12	12.25	0.00
CJSAT	12	7.27	0.02
CJRASV	12	59.89	0.00

The statistically significant difference of the variable TERENT determines the K1 type of a smaller centre with hard courts in comparison to the K3 type of smaller centre with clay courts (Table 5). Sports activity in the centres of type K1 is directed exclusively

to hard courts, so that a significantly higher degree of utilization of hard courts during summer (ISKT) and winter (ISKT2) is understandable, especially because such a surface is completely neglected in the centres of type K3. However, poor playing conditions under the floodlights result in a significantly lower degree of utilization of the floodlit courts in winter (ISKR2). Hard courts and poor floodlights lead to significantly lower prices of renting a court per hour during the day (CJSAT) and under the floodlights in the evening (CJRASV). However, an important characteristic of a tennis centre of type K1 is a significantly larger number of children who participate in tennis on a recreational basis (KRREKDJ). The low price of court utilization per hour made it possible for the children who did not express an inclination towards top tennis or who were of a lower economic status to be engaged in tennis on a recreational basis.

Table 6: The number of realized per-hour-users according to the type of a tennis court per month.

	ISKZ	IKSZ2	ISKT	ISKT2	IKSR	ISKR2
K1	175.56	129.96	300.96	254.79	34.00	34.00
K2	2660.00	1960.00	480.00	480.00	680.00	1190.00
K3	665.48	523.24	4.76	4.76	158.36	243.96

The main characteristics of a particular type of tennis centre, for example, the type of users, the quality of the court or the quality of the offer, affect the degree of utilization of tennis courts. The degree of utilization of a tennis centre is determined by a maximal number of per-hour-users (SK)1, that is, by the number of one-hour court users. According to the Book of Regulations regarding the regional standards, standard specifications and the zoning conditions for the planning of a network of sport facilities, the number of per-hour-users (SK) of a playing unit for tennis amounts up to 215 per week (Bartoluci, 1997:91). However, in practice, due to the weather conditions and other factors this number is significantly lower, and since this research primarily deals with a real degree of

utilization of the available facilities, and not with the maximal, and therefore questionable capacity, the values used in this paper relate to the possible capacities of tennis courts in the Split area.

According to the realized mean values of the degree of utilization of particular types of courts per day, the realized values of per-hour-users a month (Table 6) were calculated for the obtained types of tennis centres (Table 1), taking into account the limitations such as weather conditions.

In order to calculate the values of a possible capacity of a tennis centre the meteorological characteristics of the Split area were taken into account. During summer, namely, from April 1 till September 30, tennis may be played on average 10 hours of daylight and 3 hours under the floodlights. In winter, namely, from October 1 till March 31, tennis may be played on average 8 hours of daylight and 5 hours under flood lights. Since in Split tennis is played outdoors throughout the whole year, the utilization of the courts is not possible if it rains (the annual average number of rainy days in Split is 1122), it is not possible in winter after 9 p.m. due to low temperatures and it is not possible in midsummer from noon till 3 p.m. due to high temperatures. Taking into account the listed meteorological characteristics, the monthly values of per-hour-users (SK) were calculated: in summer 400, in winter 320, in summer on floodlit courts 120 and in winter on floodlit courts 200.

According to the monthly values of per-hour-users and the average number of particular types of courts the values of possible per-hour-users for each obtained type of tennis centre were calculated (Table 7). While calculating the realized and the prospective per-hour-users per month for particular types of tennis centres the numbers with decimal places were obtained due to the

Table 7: The number of possible per-hour-users per month according to the type of court.

	ISKZ-M	IKSZ2-M	ISKT-M	ISKT2-M	IKSR-M	IKSR2-M
K2	2800.00	2240.00	800.00	640.00	1020.00	1700.00
K3	1028.00	812.80	112.00	89.60	256.80	428.00
K1	456.00	364.80	684.00	547.20	120.00	200.00

Table 8: Utilization degree in percentages according to the summer-winter period and according to the court type.

	ISKZ	ISKZ2	ISKT	ISKT2	ISKR	ISKR2
K1	35.0	35.6	40.0	46.6	28.3	17.0
K2	86.4	87.5	54.5	75.0	66.7	70.0
K3	58.9	64.4	3.9	5.3	61.7	57.0

average values of particular types of tennis courts.

The data about the realized effect of per-hour-users and the data about the possible capacity of per-hour-users present us with the degree of utilization expressed in percentages (Table 8). The utilization degrees for each court type in the summer and in the winter period for each tennis centre were calculated and graphically presented (Graph 1).

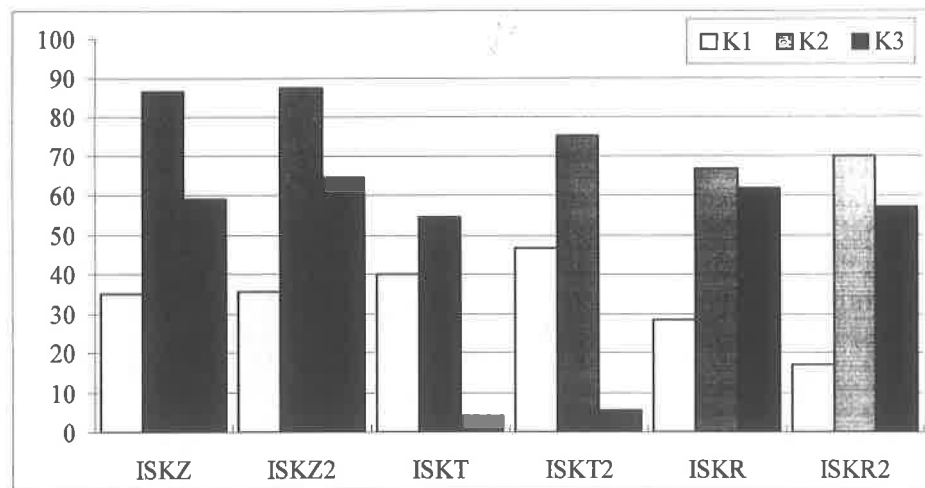
The utilization degree was the highest in the K2 tennis centre type, which, because of the large number of courts, attracts a large number of users of all categories. Apart from the tennis school participants and apart from the people who participate in tennis on a recreational basis, the courts were also used by competitors, either in the form of a club training (organized by the clubs) or additionally in the form of individual training (organized by the competitors themselves). Smaller centres with clay courts (K3 type of centres) completely neglect the possible utilization of hard courts, that is, the programs that can be carried out on such courts. Smaller K1 type tennis centres with hard courts had a low utilization degree (less than 40%) and they probably operated at a loss.

Clay courts were equally utilized during the day both in summer and in winter in all three tennis centre types. Hard courts were more utilized during the day in winter, probably because of the tennis school which is, as a rule, organized in winter on hard courts. The

floodlit courts in smaller centres were more utilized in summer, and less in winter, whereas the floodlit courts in smaller centres were more utilized in winter, probably because of the large number of competitors who have more group and individual training hours a day.

Discussion

The classification of tennis centres from the Split area done by means of a cluster analysis on K groups confirmed three hypothetical tennis centre types, which may be termed according to the type and number of



Graph 1: Utilization degree according to the type of tennis centre.

tennis courts as follows:

- a big centre with 9 clay courts (K2);
- a smaller centre with three clay courts (K3);
- a smaller centre with 3 hard courts (K1).

Both the organization of recreational tennis and the organization of competitive tennis was carried out in the big tennis centre. Due to the large number of mostly clay courts, the young competitors were given an opportunity to have a quality training in all competition categories. Apart from the training sessions organized by the clubs, the young competitors additionally used the courts for individual training sessions, which directly affected the degree of utilization of

directly affected the degree of utilization of the tennis courts. Due to the large number of competitors, the utilization degree of floodlit courts was higher in winter in contrast to the smaller tennis centres in which the degree of utilization of floodlit courts was higher in summer. Due to the quality organization of programs the utilization degree of hard courts was above 50% in summer, that is, above 70% in winter when, as a rule, the tennis school is organized. A large number of courts enables a quality organization of a larger number of competitive and recreational tournaments. Sports programs, intended for all categories of users, comprising the tourist offer in a big tennis centre attract both a large number of adults who participate in them on a recreational basis and who play tennis on a regular basis and a larger number of children who are considered to be beginners at playing tennis. These children are an important category of users because they are either future competitors or people who will play tennis on recreational basis. The users of courts may use the club premises, locker rooms and showers with hot water. In a big tennis centre there is also a parking lot for visitors, as well as stands for the audience. Supplementary services in a centre are: gym, racket maintenance, and catering. Apart from a rich model of sport-programs offer and accompanying services, which are taken care of by a large number of coaches and other personnel, the big centre reaches a high degree of utilization. Together with the application of marketing principles for the purpose of further business development, this type of tennis centre may represent a successful and profitable sports centre.

As for the model offer, the smaller tennis centre with three clay courts is similar to the big tennis centre. It also attracts users of all categories, but the number of these users is significantly lower. The coaches and the other personnel take care of the sports programs and of the maintenance of the facilities. The business dynamics being somewhat lower, for example, the marketing principles were not applied and the number of tournaments organized was smaller, this type of tennis centre retained a utilization degree of about 60%. The utilization of clay courts and of the floodlit courts was equal both in winter and in summer, which is probably the consequence

of good playing conditions (quality surface and floodlights) on the one hand and of the well organized tournaments on the other. The surface of this type of tennis centre is smaller and the courts are of a minimum allowable size without the stands for the audience. In this type of a tennis centre there are no hard courts, which results in a very low degree of utilization throughout the whole year (3.9 - 5.3%). The smaller tennis centre with three clay courts is a quality sports facility which has a quality offer of sport programs and accompanying services. Although the business activities in such a centre were minimal, it succeeded in retaining a high degree of utilization which may produce a profit at the end of each year.

The offer model of a smaller tennis centre with three hard courts was below average. There were no club premises, no locker rooms, and no toilet facilities. The court users could not use any other accompanying services. The utilization degree was lower than the utilization degree of hard courts in a big tennis centre. Because of a poorer surface and because of the poor quality of the lighting the utilization degree of the floodlit courts was below 30%. Because of the poorer offer and poorer playing conditions the price of renting the court per hour was very low. There was no personnel employed on a full-time basis. The court maintenance and the organization of programs was carried out periodically by one or two people. The tennis school and individual training sessions were the only programs offered. A new category of users emerged spontaneously in this type of tennis centre, namely, the children who played tennis on recreational basis. The children whose parents were of a lower economic status and who were not inclined to competitive sport, enjoyed playing tennis on a recreational basis. Stern et al. (1990) researched the motivation for the participation in sports recreation in their childhood by means of 12 motives for participation. They established the ones which were mostly represented: 'I learn in order to be as good as possible', 'I learn in order to improve my skills', 'I have a coach who supervises us', 'I become stronger and healthier'. The comparison of answers given by children who were 9 and 10 years of age and those who were 6 and 7 years of age

statistically the most significant: the feeling of belonging to a team, the feeling of fun and adventure, being with friends and making new friends.

The adults who played tennis on a recreational basis were the most numerous category of users and they equally used all three types of tennis centres, which leads to the conclusion that people of different financial means equally participate in recreational tennis. In order to develop recreational tennis, recreation-based competitions, that is, a recreation league at a town level, could be organized by smaller tennis centres which have, on average, three clay courts. In this way, the offer and the degree of utilization of these centres could be improved. The children who play tennis on a recreational basis went to those tennis centres in which the playing conditions were provided for minimally, which resulted in low prices of using the courts. The tennis centre with hard courts should, provided that minimal investments (toilet facilities) be made and provided that an expert be employed, encourage the organization of recreational tennis for children. For example, a tennis school, but not in order to make a sport-related selection, could be organized together with recreational courses and tournaments for children. Those children who are in for competitive tennis go to a big tennis centre in which training sessions for all categories of competitors are organized together with

tournaments at national and international levels.

Conclusion

By means of cluster analysis on K groups applied on 16 tennis centres three different models of tennis centres were established. By analysing each of these tennis centre models the qualitative difference among them was established with regard to the number and the type of tennis courts, the diversity of programs, the organizational structure and the utilization degree of a centre. Three types of tennis centres pointed to the specificity of each individual centre, and their classification makes it possible to establish their socio-economic value. The disproportion between the offer and the demand is evident, in that the demand for tennis is larger than the offer. The future construction of tennis centres should be oriented towards building quality tennis centres which will offer programs for all those who are interested in them, including the possibility of a utilization of tennis courts throughout the whole year. Together with further research a similar analysis may help design modern tennis centres. The answers obtained by the classification of tennis centres may help improve the existing offer as regards the tennis centres, thus creating the basis for further improvement of the offer and its quality.

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