

The serve as technical element in university volleyball

El saque como elemento técnico en el voleibol universitario

Yordan Portela-Pozo¹, Elizabeth Rodríguez-Stiven², Rosa Alexandra Moreno-León³

¹M. Sc. Profesor Auxiliar. Universidad Deportiva del Sur. Estado Cojedes, Venezuela. portelapozo2004@gmail.com

²M. Sc. Profesor Auxiliar. Universidad de las Ciencias Informáticas. La Habana, Cuba. beth@uci.cu

³M. Sc. Profesora Agregada Dedicación Exclusiva. Universidad Deportiva del Sur. Estado Cojedes, Venezuela. rosalexandraml@gmail.com

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ABSTRACT

The objective of the present work is to analyze the trends presented by the serve and its relationship with the reception in current male university volleyball. To carry out this research, a documentary study of scientific articles was carried out, as well as the observation of 1425 serves made in 37 games. This analysis was carried out to determine the elements that affect the correct technical execution of the serve in order to improve its effectiveness, as well as the areas of greatest vulnerability to obtain direct points.

Keywords: Serve; Reception; Serve variability; College men's volleyball

RESUMEN

El objetivo del presente trabajo es analizar las tendencias que presenta el saque y su relación con la recepción en el voleibol masculino universitario actual. Para realizar esta investigación se realizó el estudio documental de artículos científicos, así como la observación de 1425 saques realizados en 37 partidos. Este análisis se realizó para determinar los elementos que afectan la correcta ejecución técnica del saque en función de mejorar su efectividad, así como las zonas de mayor vulnerabilidad para obtener puntos directos.

Palabras clave: Saque; Recepción; Variabilidad del saque; Voleibol masculino universitario

INTRODUCCTION

Sports physical activity has become one of the most important social instruments in our society. Today, no one doubts that the regular and continuous practice of physical activity is an indicator of good health. Furthermore, in our society physical activity is understood as one of the main elements of occupation of free time and leisure (Sánchez, 2017).

A university as a health space must be a space that promotes and protects the health of its community and develops actions that allow its workers and students to acquire a healthy lifestyle. For this authors understand that it is essential that the universities themselves invest in the construction of infrastructures, which facilitate sports activity and generate healthy initiatives (Sánchez, 2017).

It is called university sport, the one performed by the university student and organized by the Sports Services of each University. This practice is not only competitive, but it is frequently directed towards sports recreation activities to use leisure time in a healthy way (Pozo and Stiven, 2014).

Volleyball has become a more dynamic game, in which players with high technical, tactical, physical and psychological mastery are increasingly needed, since the demands for achieving victory are more complex and where one of its fundamental peculiarities is that each terminal action constitutes a point. The high indicators and the growing mastery of the main teams today, require a more in-depth analysis of the particularities of sports activity, linking with applied sciences to achieve a more scientific interpretation of the phenomena that occur in the field. current sport (Valcárcel, Pozo, Márquez and Stiven, 2014).

The reception of the serve is the first element of the game that takes place within the sequence of complex I or KI as many coaches call it. Therefore, it is the first contact that a team makes to build its attack in search of the recovery of the serve, currently, one of the two general ways to obtain a point. This contact with the ball is conditioned by the trajectory and speed of the ball in the opponent's service, which directly influences their technical execution. For these reasons, the work of serving and receiving the serve throughout the training process is currently a fundamental task for most teams (Ureña et al., 2001; Pozo and Stiven, 2014).

In volleyball, the general objective of the game can be divided into two fundamental ideas, on the one hand, maintaining the serve, on the other, recovering it. Although currently both involve scoring, the conditions for achieving it cause notable structural changes between one phase and another. To favor the understanding of the volleyball structure and the training dynamics, the development of the game is classically divided into two large phases. On the one hand, the K1 complex, featuring actions that seek to obtain the point when the service is in the opponent's possession, also called the service change or recovery phase, and on the other, complex 2 or KII, responsible for preserving the serve or, which is the same to get the point when the serve is in one's own possession (García, 2017; Ureña, Calvo and Lozano, 2002).

The success of this sport is its variability and its technical complexity. There are various technical elements in volleyball, some in charge of the defense such as reception, fielding and blocking and others in charge of the attack such as the shot and the serve. Being the serve the only technical element in which it is possible to possess the ball and make the decision of how it will be executed; As the SICCED test points out when it states, the most important thing when serving is to control the ball, its speed and its trajectory changes, therefore, it is vital to serve the ball to the opposing court without errors. The speed and sudden changes in the trajectory of the ball will be effective, as well as the tactical aspects of the service, considering that this is the first element of attack in the game since it can provide us with direct points or disable the opponent's offensive actions (Pérez, 2014, p.178)

Men's volleyball at the University of Informatics Sciences (UCI) is one of the main sports with a high competitive level at this level. Despite its competitive quality, the tournament has modifications in its regulations regarding the number of sets played per matches, only 3 sets are played to win 2 sets, only the final match is played the 5 sets to win 3 sets as established on an international level.

On the other hand, the relationships between the behavior of the serve and its influence with the successful actions during the game of volleyball, are differentiated by the measurements of the different types of serves executed and directed to the back zones 5, 6 and 1 of the field, are conditioned by factors such as the level of

training of the subjects and the measures analyzed, therefore, with the purpose of making thematic contributions, the objective of this study is to analyze the trends presented by the serve and its relationship with the reception in current men's volleyball at the University of Informatics Sciences.

METHODS

Observation method. It consists of a systematic observation sheet where all the exposed serve actions are recorded, along with other non-analyzed data that facilitate their identification, adapted to the conditions of the investigation. The data associated with the observations of the serve directed to the sagüeras zones as offensive action focused on the receipt were used. The data were treated as follows:

A serve is considered a successful offensive action if it manages to hinder the opposing team's K-1.

A receipt that involves a significant displacement of the passer or that prevents the passer from making the pass is considered a difficult receipt.

In this research authors will work with the variables described in Table 1.

Table 1 Description of the variables in analysis, typology and range of values

Variables	Type	Values	Description
TS	Nominal	1	Floting Suspension
		2	Floting in Place
		3	Suspension Racket
		4	Racket in Place
Zone	Nominal	Z1	Zone 1
		Z5	Zone 5
		Z6	Zone 6
RSD	Binary	0	Absence
RCD			
PD			
Success			

Note: RSD: Receipt Without Difficulty, RCD: Receipt With Difficulty, PD: Direct Point, TS: Type of Serve. Source: self-made.

Statistical method. It consists of statistical analysis through the Konstanz Information Miner (KNIME), which is an open source integration, reporting and data analytics platform that integrates various components for machine learning and data mining through its modular pipeline concept. data (Tiwari & Sekhar, 2007) and with the Principal Component Analysis (PCA) technique using the XLSTAT (2017) Premium

software (v19.5.47062), integrated into Microsoft EXCEL 2013, in order to find a structure that they could follow the data from the variables and a multivariate exploratory analysis that facilitate its development, adapted to the conditions of our research.

The practical contribution. It is based on providing accurate data on the behavior of the serve in the games held at the UCI during the last five years, as well as a new type of protocol for its recording that contributes to improving and correctly structuring the training process of the volleyball player, responsible for the elevation of the yields, thus satisfying the new demands of this sport discipline to achieve success.

Research population and sample. The basic unit of analysis is the serve and the population is made up of the 1425 serves directed to the sagüera areas developed during 37 observed matches, of which 21 were with 2x0 results, and 16 were 2x1 with a total of 90 sets analyzed having represented all the faculties of the University of Informatics Sciences in the university games. In each game the modifications of volleyball in the university sport in Cuba were taken into account.

In the data analysis, authors work with nominal variables, taking into account that the characterization of a serve based on the described variables is repeated several times, it is intentionally decided to take the 36 service configurations that were identified as a sample.

A configuration is considered to characterize a serve based on the variables described. Table 2 shows a configuration of a racket serve in the place directed to zone 1 that was received without difficulty, therefore it is not considered as a successful offensive action. This configuration is repeated 9 times in the population.

Table 2. Serve configuration

IDS	TS	Zone	RSD	RCD	PD	Success
S7	4	1	1	0	0	0

Note: Service identifier (IDS). Source: self-made.

RESULTS

In order to find out which structure the data could follow from the variables, an analysis was carried out using the principal components technique. As the authors

work with nominal variables, the analysis is carried out with the correlation matrix with N-1 degrees of freedom to compute the variance.

First, the Blatlett sphericity test was applied, which provided a p value = 0.001 lower than Alpha = 0.050 of significance, which indicates that the variability of the data is adequate for the analysis of principal components. As Meyers, Gamst and Guarino (2013) point out; the null hypothesis is rejected indicating that none of the variables is significantly correlated.

A four-factor structure was extracted, representing 100% of the explained variance. As it appears in Table 3 and Table 4, the most important factor to explain the success of the serve in UCI university games is F1. Which is associated with the items RSD and RCD (32.35% of the variance of the success of the serve). Followed by the F2 factor represented by item PD (29.57% of the variance of the success of the serve). Taking this result into account, the analysis carried out focuses on the first two factors (F1: RCD, RSD and F2: PD) because these represent 61.92% of the explained variance. In other words, this two-factor structure explains about 62% of the success of the serves in the sample. The remaining 38% is explained by the other two factors associated both with the area and the type of service. These results will be explained further in the discussion section.

Table 3. Analysis of principal components, eigenvalues and percentage of variability explained for each factor

	F1	F2	F3	F4
Eigenvalues	1,61	1,47	1,04	0,86
Variability (%)	32,35	29,57	20,88	17,19
Cumulative variability (%)	32,35	61,92	82,81	100,00

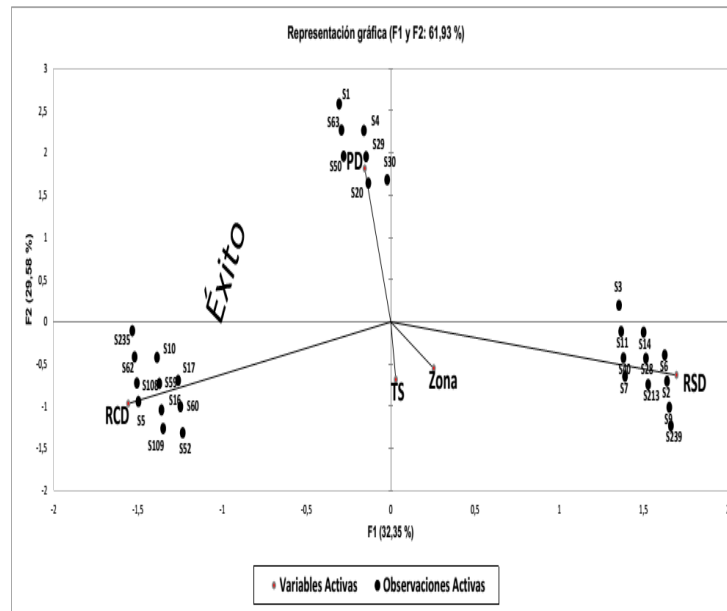
Source: self-made

Table 3. Principal component analysis. Eigenvectors and representative variables by factor

	F1	F2	F3	F4
TS	0,01	-0,29	-0,69	0,66
Zone	0,11	-0,24	0,72	0,64
RSD	0,73	-0,27	-0,04	-0,18
RCD	-0,67	-0,42	0,06	-0,11
PD	-0,07	0,78	-0,02	0,32

Source: self-made

In Figure 1 the data is represented using the first two factors, as you can see the data is clearly grouped according to the success of the serve. In the first component it is seen how the RCD and PD (successful serves) are in the negative half plane, contrary to the RSD (failure) is the positive half plane. The second component can be seen how the PDs are in the positive half plane indicating a direct success. The RCD and RSD are in the negative half plane indicating receipt presence, however, the RCD are on the left side of the axis as is the PD indicating success of the serve.



Source: self-made

Figure 1. Graphic representation of the data in the first two components. Note: F1: Factor 1 and F2: Factor 2. Source: Own elaboration.

The analysis carried out clearly shows us the grouping of the data regarding the success of the serve. However, it does not provide sufficient information on the association of the type of serve and the zone regarding the success of the serve. In order to test whether there is an association between success, the type of serve and the zone, a correspondence analysis was carried out.

Previously, it begins by analyzing whether there is an association between the area and the success of the serve. As can be seen in the contingency table generated (see Table 5) of the 633 successful serves in the sample, 304 were directed to zone 5 with 48%), which indicates that it was the zone that had the most success. However, it was the area towards which fewer serves were made (401 representing

28% of the total). The highest number of serves was made towards zone 6 (601 which represents 42%). Of which only 137 are successful serves (represents 21.6% of successful serves), being the area that was least successful. These results are explained in more detail in the next session.

The chi-square test showed that the value of the statistician is 30.312, with a Sig = 0.000 less than 0.05, which is why the null hypothesis of independence between the variables is rejected and it is concluded that there is dependence between the area and success. serve. To determine the directionality of the association, the Lambda test was used. Which resulted in Sig = 0.006 for success less than 0.05 and Sig = 0.900 greater than 0.05 for the zone. For what is concluded the success depends on the area to which the serve is directed.

Table 4. Zone vs Success contingency table

		Success		Total
		NO	Yes	
Zone	Z1	231	192	423
	Z5	97	304	401
	Z6	464	137	601
Total		792	633	1425

Source: self-made

In the analysis of the type of serve and the success of the serve, the contingency (see Table 6) shows that of the 633 successful serves 286 are Suspension Racket (45% of successful serves), which indicates that it was the type of service more successful was. However, it is one of the serves that was served the least (26% of the total number of serves performed). The Floting in place serve was the most performed serve (592 of the total serve for 42%), of which only 128 were successful serves (20% of successful serves), which indicates that it was the type of serve that less successful. These results are explained in more detail in the next session.

The chi-square test showed that the value of the statistician is 28.856, with a Sig = 0.000 less than 0.05, so the null hypothesis of independence between the variables is rejected and it is concluded that there is dependence between the type of serve and the success of the serve. To determine the directionality of the association, the Lambda test was used. Which resulted in Sig = 0.006 for the Type of serve less than 0.05 and Sig = 0.014 less than 0.05 for the success of the serve. Therefore, it is

concluded that there is a bidirectional dependence between the variables. Success depends on the type of serve that is made; and depending on the type of serve that is made, it will be successful.

Table 5. Contingency table TS vs Success.

		Success		Total
		NO	YES	
TS	Floting in place	464	128	592
	Suspension Floting	164	187	351
	Racket in place	75	32	107
	Suspension Racket	89	286	375
Total		792	633	1425

Source: self-made

A graphic analysis of multiple correspondences reaffirms that there is an association between the Suspension Raqueta and Floting serves directed to Zone 5 and 1 respectively with respect to success, which corresponds to (Gil, del Villar, Moreno, García-González and Moreno, 2011). In Figure 2 it can be seen that the directing vectors of the serve Racket suspension, Floting Suspension, Zone 5 and Zone 1 are directed to the same left half plane where the successful serves represented by RCD-1 and PD-1 are concentrated. The racket serve in place is the least successful serve, as are the serves that go to zone 6 which are represented in the right half plane by RSD-1. The Floting-in-place serve is one of the most frequently performed serves and is located close to the axis, but in the direction of the right half plane, indicating that most of the serves are not successful.

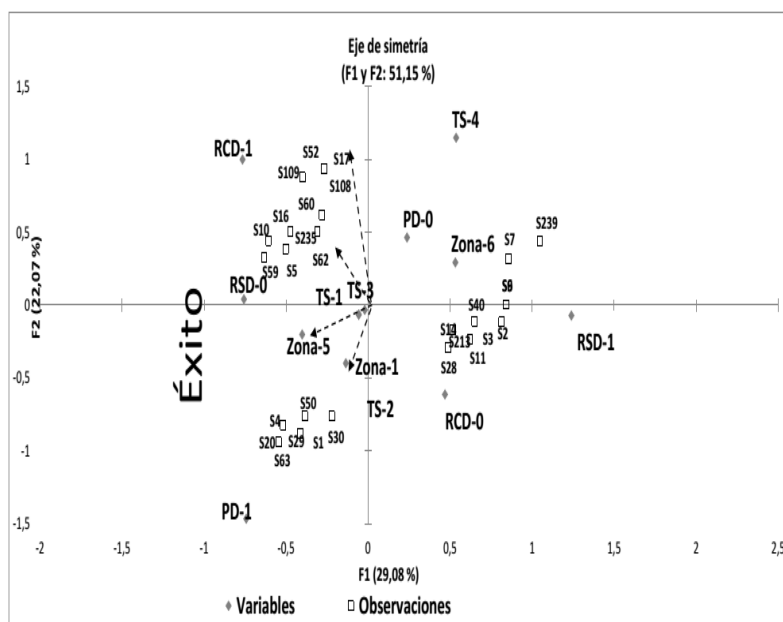


Figure 1. Multiple correspondence analysis of the successful serve and its relationship with the terrain zones and the type of serve. TS-1 Suspension Floiting, TS-2 Floiting in Place, TS-3 Suspension Racket, TS-4 Racket in Place. Source: self-made.

DISCUSSION

In the present study, it was proposed to determine which were the trends that the serve presented in current UCI Volleyball, as well as to obtain a behavioral profile of this technical element and its influence with successful actions during the game, differentiating the measurements by the type of service executed and directed to the back zones 5, 6 and 1 of the field.

It is important to mention that in Figure 1 a structure of the serve is analyzed with respect to success, but it does not provide sufficient information on the association of success with the zone or type of serve, a result that is similar to the research of (Ureña and Santos, 2001).

When analyzing Table 5 and Figure 1, it is shown that of the 633 successful serves, 304 are directed to zone 5. Furthermore, only 97 of the 792 failures are directed to zone 5. Which indicates that serving for zone 5 is a very adequate tactical strategist that corresponds to what was stated by Hernández, Pardo and Fonte (2014); Calzado, Robert and Rodríguez, (2008). However, it is the area where the fewest serves are directed.

Observing the serves by zones, can be obtained that 24.2% go towards zone 5, this being very positive when it comes to counteracting the tactical actions of the opposing team since in this zone is where the forward receiver receives, 31.8% towards zone 6, 43.9% towards zone 1 where I think they should put more powers towards this zone to achieve more direct points, 13.4% of the serves either have not passed the net or have gone outside the spatial limits set in the competition regulations and there are few aces that score direct points in UCI games, only 2.4%, since they are put at risk, due to the conditions of the terrain and not enough power is printed to reach a direct point.

The present analysis gives us a negative result regarding the results of the technical execution in the execution of the serve in these games. Technique is a fundamental factor when executing the serve since technique is one of the most influential, important, determining and significant factors for sporting performance within the volleyball game, being of the utmost importance to mechanize it as also stated (Ureña and Santos, 2001).

In this case, all the zones have been used to perform the serves, it can be included the short serves that fall in zones 4, 3 and 2 within the back zones to work more comfortably, which shows us a much more imaginative and open of the UCI teams to create a different, different and surprising game against the rival on duty, which manages to avoid the accommodation of the opponent when receiving the serves.

It is important to mention that zone 5 is shown as the most effective for scoring points, both direct points and points for mistakes made by the rival team, but this aspect does not guarantee the total success of the game since in volleyball direct points are achieved few times during a match and there are also other technical elements that create a diverse game dynamic. In line with our results, studies such as that of (Marcelino, Sampaio and Mesquita, 2012) show that to obtain a victory in the set it is necessary to achieve high performance coefficients in all game actions, highlighting the importance of attack actions. and serve (Zetou, Moustakidis, Tsigilis & Komninakidou, 2007).

In the same way, in the study by Conejero, Calver, Fernández-Echeverría, Gil-Arias and Moreno (2017), with players corresponding to the 21 teams participating in the

Spanish Junior Men's Championship, it was revealed that Actions such as serving, blocking, and attacking were the creators of sets won or lost. Therefore, in these actions, good coefficients of performance make it more likely that the final result of the set will be a victory.

Among the main findings, it was evidenced that regarding success have four fundamental profiles:

PS1: Suspension Racket Serves directed to Zone 5.

PS2: Suspension Floating Serves directed to Zone 5.

PS3: Suspension Racket Serves directed to Zone 1.

PS4: Suspension Floating Serves directed at Zone 1.

However, authors can define in a general way that the serve as an offensive action in this event was not good. Fundamentally due to the fact that successful serve profiles are the ones that are least performed.

With these data can be obtained references that can be compared between teams, with the sole purpose of being able to give tangible reasons for the success of our UCI team that represents us at other levels. Therefore, this analysis can serve us to recommend to the coaches to orient the training sessions looking for an improvement in the decision-making capacity of the athlete in the different game actions. During the training process in training categories, it would be necessary to guarantee a balance or adjustment between the tactical-decisional development of the players and their ability to execute the different game actions, so that both can optimally contribute to obtaining performance in game (Conejero, et al., 2017).

CONCLUSIONS

The realization of the serve as an offensive action is not good, mainly due to the fact that the power serves with jump were the least performed with respect to the floating serves with jump and support. The variability of the serve and its direction to the back zones 5, 6 and 1 of the field, significantly influences the success of the reception and execution of complex 1, which suggests certain demands in its strategic approach to achieve a greater amount of direct points or for errors of the opposite in the reception.

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