

COMPARATIVE STUDY ON ANALYSIS OF THE VOLLEYBALL TEAM SERVICE

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Abstract: Currently, the game of volleyball is one of the most popular sports on the planet. With a number of practitioners exceeding 800 million people who play volleyball at least once a week, 900 million fans and more than 220 affiliated federations, volleyball ranks 5th in the world in a list of all sports. Unfortunately, at the beginning of 2020, the outbreak of the coronavirus affected different parts of the world. Without a doubt, the coronavirus has had and is having an impact on various aspects of our lives. Many industries have been affected by the coronavirus, and sports is one of them. It is worth noting that Covid 19 has had a profound negative impact on all sports. All the gyms were closed for a long time, and the athletes could no longer train. The most affected were athletes practicing team sports, therefore also volleyball players, both professionals and amateurs, who were not allowed to come together to practice and develop their skills. When the rapid spread of the coronavirus began, the leagues reacted very quickly. As a result, all local, national and international volleyball competitions were canceled within a short period of time. Also, the ongoing competitions were interrupted, without being resumed. The most affected by the pandemic were even the children's and junior clubs, many of them giving up playing volleyball. Athletes had to overcome a lot of challenges during the coronavirus outbreak as they had to continue training and developing their skills. Setting goals for the future, analyzing mistakes and correcting them, creating a schedule by setting tasks and prioritizing them, communicating online with coaches and teammates, or watching and analyzing interesting volleyball matches can be activities during such a period. After a period of over a year, in many countries gyms have started to reopen and things are returning to normal, with competitions resuming under certain conditions.

Key words: sport, volleyball, action, service, analysis, efficiency.

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INTRODUCTION

Over time, the service has gone through numerous transformations and attempts to increase the team's performance, by executing this game action both from a technical point of view, as well as strength, speed and precision. If in the past the service represented only putting the ball back into play, nowadays it represents a formidable weapon for the team that controls it. Technology at work has been in constant change since the beginning. Due to rule changes, but also the evolution of the game and the players, the serve can be the key element in a volleyball game.

The tactical training, necessary in the execution of the service, is a complex process that includes aspects: physical, technical, psychological and theoretical, with systems and subsystems in organisation (Şerban M.H. 1997, Bâc, O. 1999, Herman G.V. 2018, Szabo-Alexi P.C. 2022). The tactic brings together a system of principles, ideas and rules for approaching competitions through which the athlete utilizes all his technical, physical and mental abilities in order to solve the problematic situations (competition) created by opponents, teammates and the environment, in order to achieve success. (Ghenadi, V. 1894, Elftmann J.M. 2012)

The individual tactic in volleyball is characteristic of each intervention on the ball or just the preparation of the intervention, translated by positioning, moving or anticipating, even "fooling" the opponent in terms of positioning in defense or attack.

We can talk about an individual tactic at the service only when the service is mastered, in which there is a certain consistency in the executions, and the player is able to execute even more types of service. Strategy at work involves the choice of execution options and efficiency percentages to be achieved. The evaluation takes place under conditions of psychological pressure imposed by the competition and analyzed before, during and after the game.

As for the service, if it reaches the opponent's court, it can have three degrees of difficulty (Bac, O. 1999):

service ended with a point or "ace"; service taken with difficulty by the opponent; service taken precisely by the opponent.

So, the elementary individual tactical aspects related to the execution of the action at work are (Anastasi A. 2011, Mârza D. 2012):

- directing the service towards the vulnerable areas of the opposing terrain;
- sending the ball to a player with a deficit when taking over;
- sending the ball to the player who made a mistake in the previous phase or who just entered the field.

However, we believe that the service execution tactic has a greater variety, including various elements, which can be combined depending on the age category and performance of the player. The execution procedure of the service will be chosen in accordance with the degree of training, performance level and physical characteristics of the performer. It is necessary for any player to know at least two procedures, one with a higher dose of risk and one of safety, the change between the two taking place depending on the moment in the game when the player is at the service (a service of safety at the end of the set, in case of a tie). Also, related to the execution process, their diversity is indicated in the case of a rotation. (Szabo-Alexi M. 2021)

The timing of the game can influence the execution, which is closely related to the ratio between risk and safety. The emotions at the end of the set or match can cause the player to change the tactic on the serve, opting for an easy serve, to the detriment of the process executed until that moment. Also, the importance of a point in the deciding set can change the course of action. However, there are players who, regardless of the moment in the game, will not opt for a "safety" service and psychological aspect is really important in this situation. (Vealey R. 2005, Wnorowski, K. 2007)

RESEARCH SUBJECTS

Within the teams of all echelons, there is a constant preoccupation with studying the opponent's tactics before the match, from the team's point of view, as well as individually, directing the service training to the areas or players with difficulties in taking over. The focus will be on perfecting the direction towards the areas where the service will be executed, this becoming a tactical weapon, through which the increase in difficulty is aimed at, the first attack phase will suffer a lot, giving the opportunity for the own team to build its attack phase defense and counterattack phase II in accordance with the requirements of the coaches and the proposed objective, that of winning the point.

The research was carried out within the National Women's Volleyball Championship of the A2 West Division, in the 2019-2020 and 2020-2021 competitive seasons. The A2 West women's division includes a number of 6 teams, namely ACS Volei Cristina Pîrv Turda, CSU Oradea, CSM Timișoara, CSU Politehnica Timișoara, SCMU Craiova and CSM Sighetu Marmației .

A number of 6 matches from the 2019-2020 and 2020-2021 competitive seasons, played by the teams that form the A2 West Women's Division, were analyzed. The matches were observed from the broadcasts carried out by the host clubs on the YouTube and Facebook platforms, but also by direct observation of the matches held in Oradea. The teams ranked in the first three places at the end of the season were SCMU Craiova, ACS Volei Cristina Pîrv Turda and CSU Oradea.

CSU Oradea is the main subject of this paper, being combatant in all six analyzed matches. The composition of the current team from Oradea includes 10 players, with the following characteristics:

Name	Age (years)	Height (CM)	Weight (KG)
B.A.	21	191	80
B.A.	19	166	56
C.F.	20	177	61
N.R.	19	180	68
B.R.	18	180	68
M.A.	22	168	64
G.A.	22	169	55
N.D.	20	171	67
A.H.	23	164	60
T.D.	20	175	71
MEDIE	20	174	65

Table 1 Research subjects

Compared to the age and height averages obtained for the women's Division A teams (27 years, height 1.84), we can see differences for both characteristics, in the sense of increased experience, but also the significant height difference for the teams in the first echelon of volleyball Romanian.

According to the statistics available on the website of the Romanian Volleyball Federation, during the regular season 2020-2021 A2 West Women's Division, a number of 3,035 services were performed.

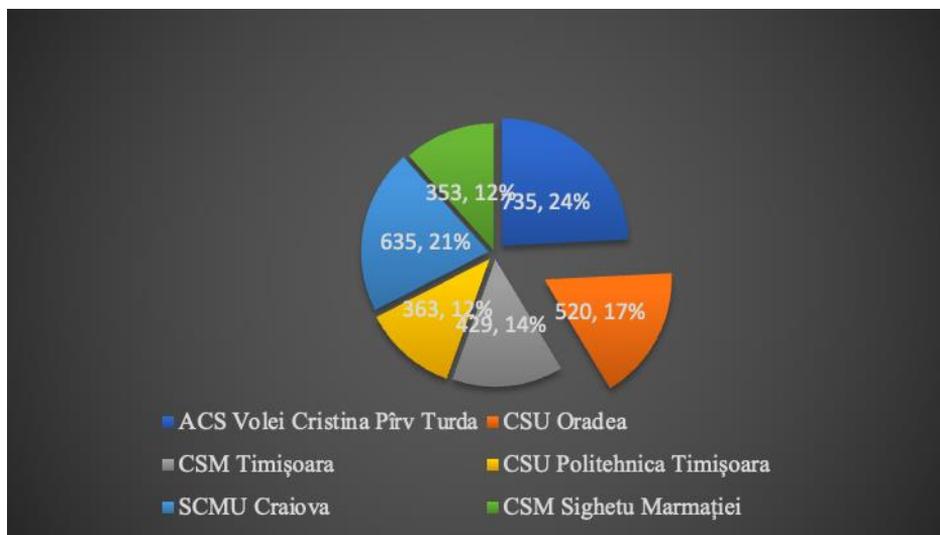


Figure 1 Service in the Women's A2 Division season 2020-2021

METHODS AND MEANS

In the present work, I watched a number of 6 official matches of the CSU Oradea team, in the second echelon of Romanian women's volleyball, namely Division A2. In these games we watched the services performed by both teams, in terms of their type, their direction to the different areas of the opposing field, their impact on the opposing defense.

The study was conducted to highlight the efficiency and influence of the serve in the game of volleyball, in Division A2 compared to Division A1.

The service techniques were grouped into: Jump Serve (JS), Float Jump Serve (FJS) and - Float Serve (FS). For each type of service, a series of parameters were recorded: the area from which the service was executed (Z), the defense area of the opponent's field where the ball was directed (FZ), the result of the service highlighted by the quality of the takeover (0^+ , 0^-) and its influence in winning the point by the serving team, the number of aces and service errors.

Therefore, we considered dividing the quality of service, depending on the quality of the pickup, into two categories:

- 0^- a good reception quality, which allows the lifter to pass to at least 2 attacking players in line 1, the realization of some tactical attack schemes.
- 0^+ a poor reception quality, after the 3-meter line of the own field, the lifter not having the possibility to pass the ball in good conditions to the players in line 1; the lifter passes with two hands from the bottom; the lifter does not reach the second ball, it being passed by another player; the ball is passed into the opponent's field without an attack.
- + "ace" we considered services that fell directly into the opponent's court without being touched by the players taking over, but also those that had a poor takeover, which did not lead to the return of the ball to the opponent's court.

As for the serving area, it corresponds to the area on the court, in the second line, according to the numbering of the areas in the official rules of the game of volleyball, respectively 1, 6 and 5,

from left to right. Regarding the division of the field into zones for the receiving team, we have numbered the zones according to the same criterion.

RESULTS AND DISCUSSION

In the six analyzed matches, a number of 886 services were executed, of which: 115, representing 13% of the total services, were marked with "-", i.e. wrong services; 94, representing 11% of the total number of services, were marked with "+", i.e. services that turned into a direct point for the team at work; 406, representing 46% of the total services, were marked with "0-", that is, services that had a good quality reception; 271, representing 31% of the total services, were marked with "0+", i.e. services that resulted in poor reception quality.

In the analyzed matches, the CSU Oradea team executed 452 services, the difference compared to the average being the number of aces achieved (13% versus 11%) and the services with a good quality takeover. The small differences may be due to the fact that CSU was involved in all the analyzed matches, having more than half of the total analyzed services.

Calitatea serv.	Calitatea serv.				
	-	0-	0+	+	Total
Procedeu					
FS	16	72	34	12	134
% din FS	12%	54%	25%	9%	100%
% din TS	4%	16%	8%	3%	30%
JS	2	15	8	1	26
% din JS	8%	58%	31%	4%	100%
% din TS	0%	3%	2%	0%	6%
FJS	43	107	98	44	292
% din FJS	15%	37%	34%	15%	100%
% din TS	10%	24%	22%	10%	65%
Total	61	194	140	57	452
	13%	43%	31%	13%	100%

Tabel 2 Type of service and quality
CSU Oradea

Calitatea serv.	Calitatea serv.				
	-	0-	0+	+	Total
Procedeu					
FS	54	200	96	29	379
% din FS	14%	53%	25%	8%	100%
% din TS	6%	23%	11%	3%	43%
JS	2	22	16	4	44
% din JS	5%	50%	36%	9%	100%
% din TS	0%	2%	2%	0%	5%
FJS	59	184	159	61	463
% din FJS	13%	40%	34%	13%	100%
% din TS	7%	21%	18%	7%	52%
Total	115	406	271	94	886
	13%	46%	31%	11%	100%

Tabel 3 Type of service and quality
Total Divizia A2

From the point of view of the procedure used at work, we observe the following: the most used procedure at work was the float jump service (FJS), with 463 services, representing 52% of the total services; the least used procedure was the service from jump to force, with only 44 executions, representing 5% of the total services executed; the float front service (FS) had a number of 379 executions, representing 43% of the total services.

Table 4 Type of service and quality - Division A (2018-2019)

Quality serv. Type	-	0 ⁻	0 ⁺	+	Total
FS	23	154	64	15	256
% FS	9%	60%	25%	6%	100%
% TS	2%	15%	6%	1%	25%
JS	19	49	23	6	97
% JS	20%	51%	24%	6%	100%
% TS	2%	5%	2%	1%	9%
FJS	53	398	191	37	679
% FJS	8%	59%	28%	5%	100%
% TS	5%	39%	19%	4%	66%
Total	95	601	278	58	1032
T%	9%	58%	27%	6%	100%

Compared to the data obtained when analyzing the service in Division A, we can see a significant difference between the number of wrong services (13% in Division A2, against 9%), to the number of aces made (11% against 6% in Division A), as well as to the difficulty of the service performed, in the sense of increasing the effectiveness of taking over from the service in the higher echelon.

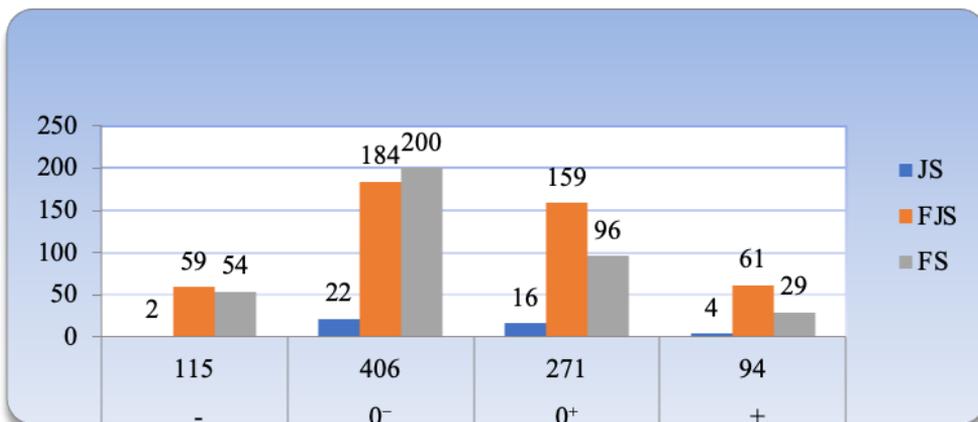


Figure 2 Comparative results type of service and quality (Divizia A2)

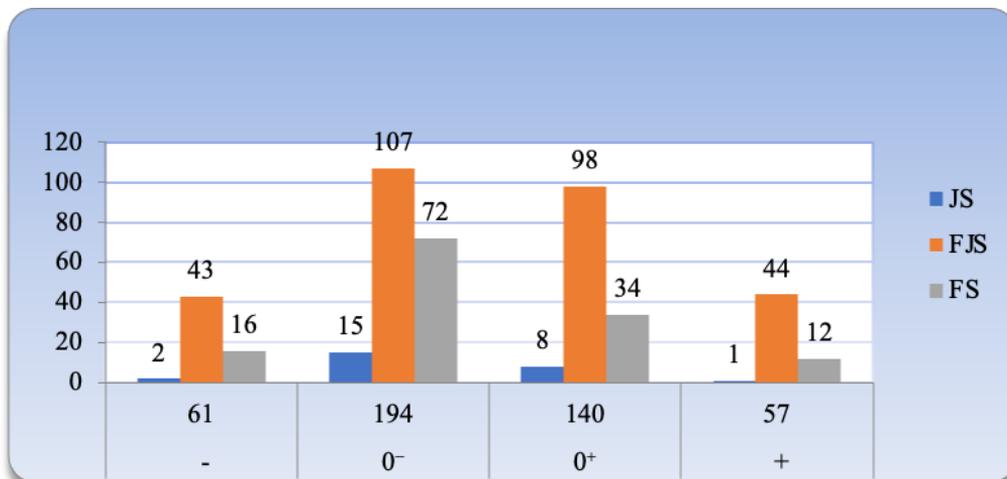


Figure 3 Comparative results type of service and quality (CSU Oradea)

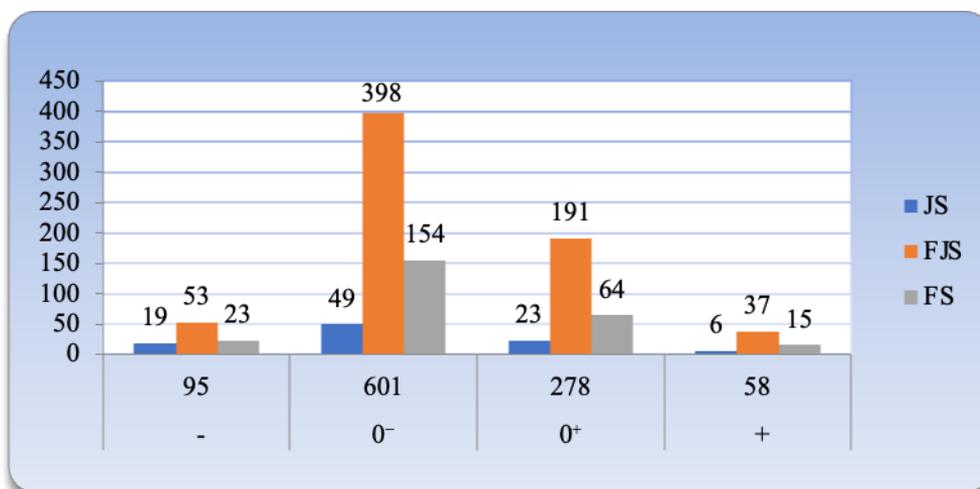


Figure 4 Comparative results type of service and quality (Divizia A1)

As it was showed in the graphs above, we represented the process used in the service and its quality, noting the following:

- the highest number of aces was made from the FJS procedure (61 points directly from the service), the team from Oradea succeeding in 44 of the 61 aces;
- JS procedures had the highest consistency, with only 5%, of the respective wrong service procedure. We believe that this is due to the very small number of services performed with this procedure. Disregarding this procedure, for CSU Oradea the greater safety at work came from the FS services (14%), compared to the average of Division A2 which had the highest safety at the FJS service (13%).
- the procedure that generated the most low-quality takeovers (0+) was FJS, with 159 services, respectively 34% of the total FJS services and 18% of the total services, at the level of

Div. A2, the percentage of 34% also being maintained for the CSU Oradea team; the FS procedure generated 96 wrong takeovers at the Division A2 niche, representing 25% of the total FS services, an identical percentage both at the A1 Division level and for the CSU Oradea team;

- the FS and FJS methods generated good quality takeovers in 53%, respectively 40% of the cases, while the JS method, which gives the ball a higher speed, had good takeovers in a higher percentage, however unrepresentative, due to the small number of executions. These averages were also maintained for CSU, lower percentages compared to Division A, where good quality takeovers, both at FS and FJS, were around 60%.

Regarding the area of execution, at the level of Division A2, we note that most of the services were executed from area 1 (662 services, representing 75% of the total services), followed by area 5 with 193 services (representing 21.5%) and zone 6 (31 services representing 3.5%). As for the Oradea team, it chose zone 1 in 69.5% of the total services, zone 5 in proportion to 28% and zone 6 with only 2.5%.

Comparing the results with those obtained at the level of Division A (Z1 - 48%, Z5 - 37.5% and Z6 -14.5%), we can see that the teams from the lower echelon, including CSU Oradea, performed from zone 1 with over 22% more services, from zone 5 with over 10% fewer services and from zone 6, again, with over 10% fewer services.

The data related to the service targeting area (for Division A2 and CSU Oradea), show that the services were predominantly directed to area 6 (440 services, representing 47-48% of the total services), followed by areas 1 and 5 with 27 % respectively 25% of the total services.

Compared to the data obtained at the level of Division A (where the services were mainly directed to Z5 - 42.6%, followed by Z6 - 31.4% and Z1 with 26%), we notice that the teams from the second echelon served more in the center of the court which can mean a lack of confidence or risk-taking, zone 6 being easier to "find", but also easier to take over by the opposing team.

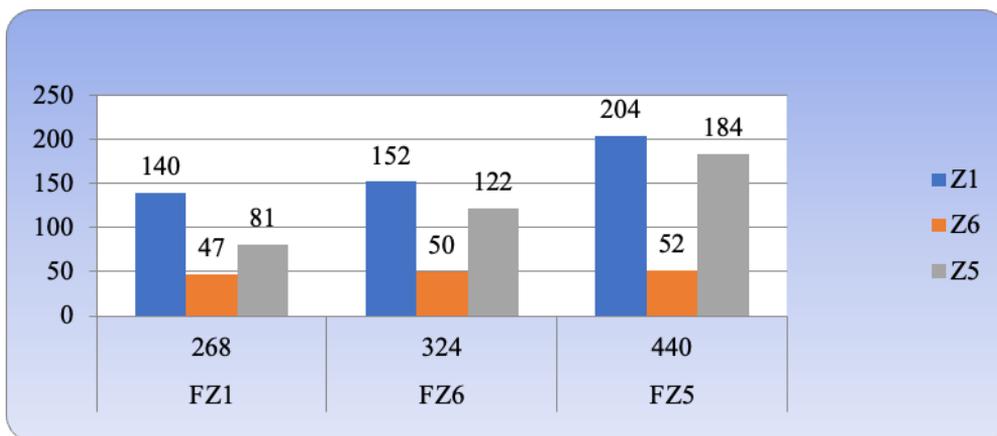


Figure 5 Comparative graph regarding the execution zone and the service direction (Division A1)

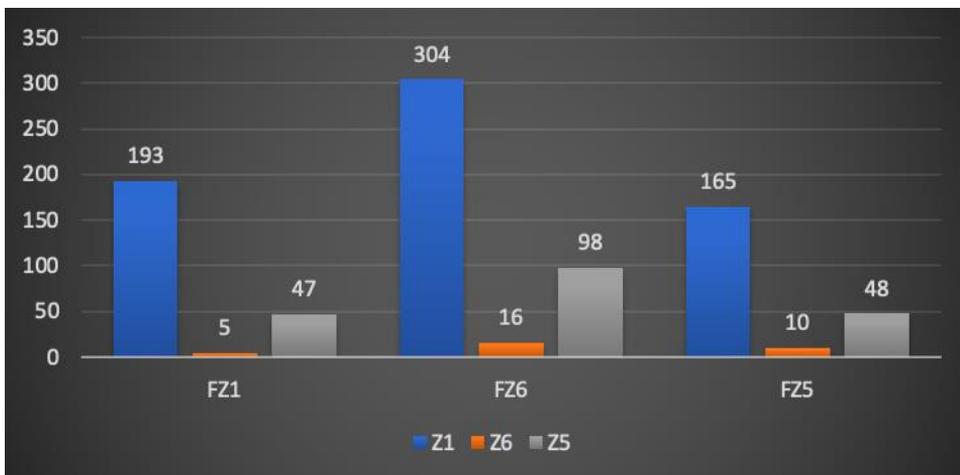


Figure 6 Comparative graph regarding the execution zone and the service direction (Divizia A2)

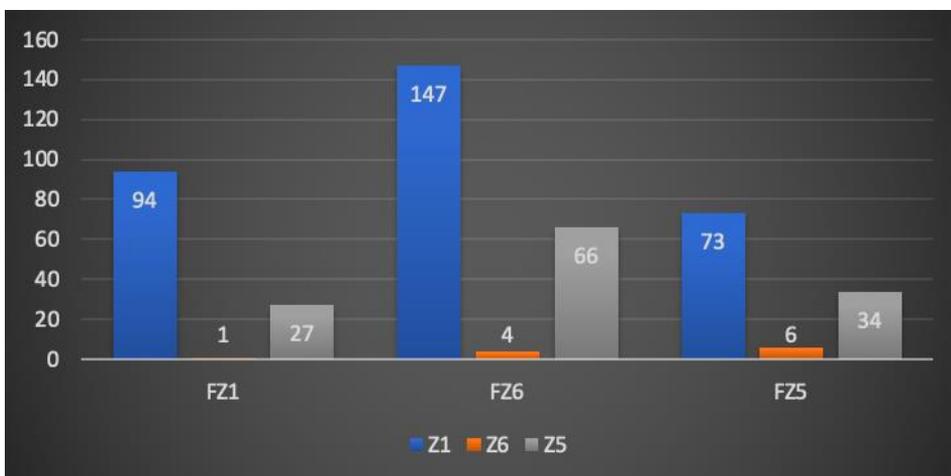


Figure 7 Comparative graph regarding the execution zone and the service direction (CSU Oradea)

From the data presented, for CSU Oradea, we observe a more balanced distribution by area in terms of directing the service, compared to the execution area. We can also observe that the services performed from zone 1 were mainly directed to zone 6 (32% of total services), followed by zones 1 and 5 (with 21% and 16%). The services performed from zone 5 also went to zone 6 of the opposing field (15% of the total services, i.e. 52% of the services performed from Z%) and to zones 1 and 5 in the proportion of 6%, respectively 7.5% of total services. The services performed in zone 6 represented only 3.5% of the total services, being mainly directed to zones 5 and 6. Graphically (figure 6 and 7) represented the quality and the process used in the service, on each area of its execution, respectively on the targeting areas, concluding:

- the services performed in zone 1, put the opposing defense in greater difficulty, regardless of the method used (109 services with a 0⁺ rating, representing 35% of the total services performed in zone 1), compared to those performed in zone 5 (29 services, i.e. 23% of the services performed in zone 5);
- most wrong services were executed from zone 1 (42 services, 13% of the services executed from this zone), but the highest percentage was returned to zone 5 (14% of the total services executed from this zone);
- the services performed by the university club to zone 1 made it more difficult to take over the opposing team (39%, i.e. 48 services), compared to those directed to zone 6 (32%, but representing a larger number of services, 70) or zone 5 (22 services, i.e. 19%). With a small difference, the percentages and areas were also preserved at the A2 Division level (37%, 30% and 24%).

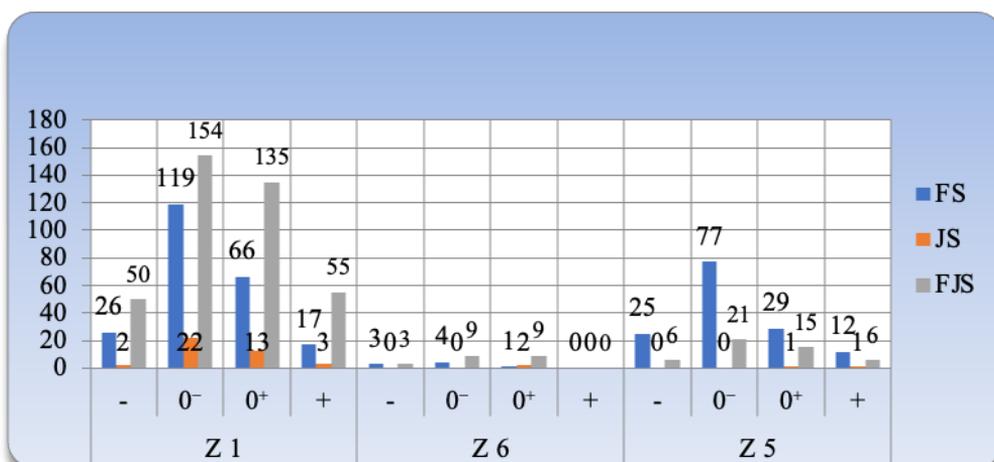


Figure 8 Comparative graph regarding zone of the execution, service type and quality (Division A2)

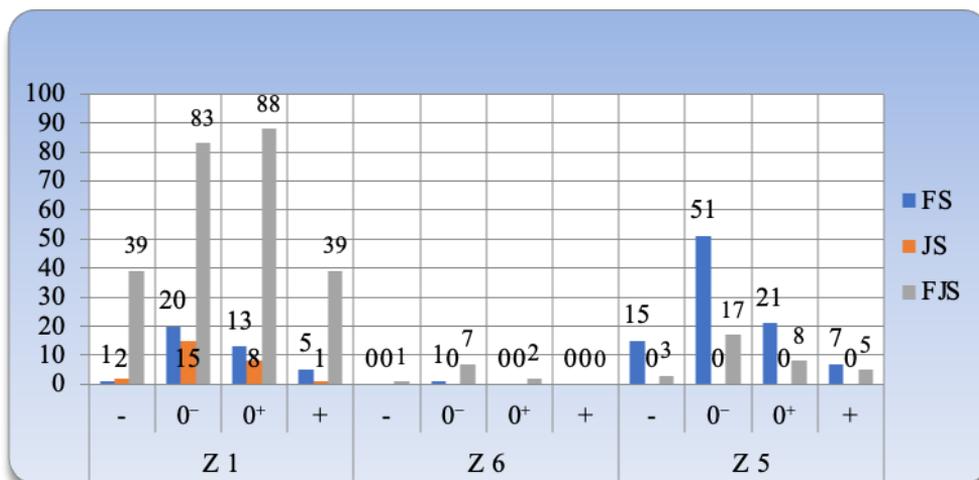


Figure 9 Comparative graph regarding zone of the execution, service type and quality (CSU Oradea)

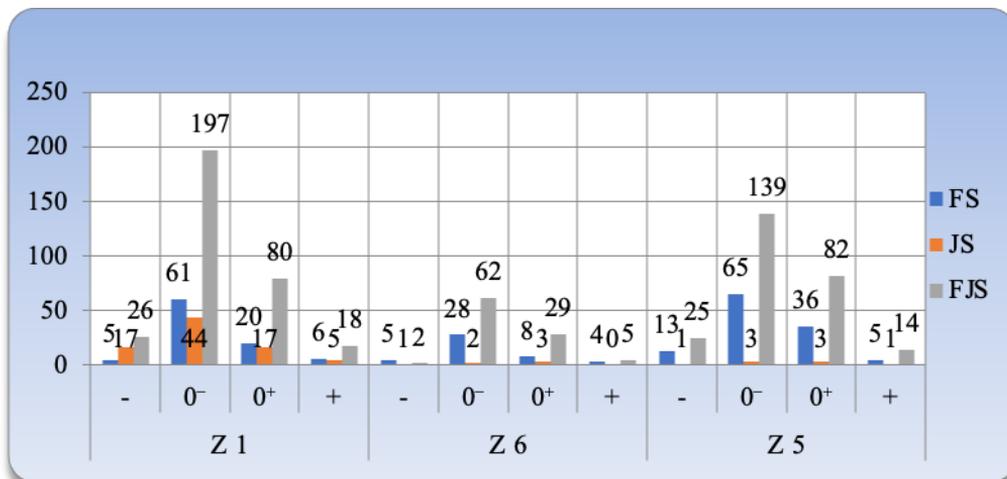


Figure 10 Comparative graph regarding the zone of the execution, service type and quality (Divizia A1)

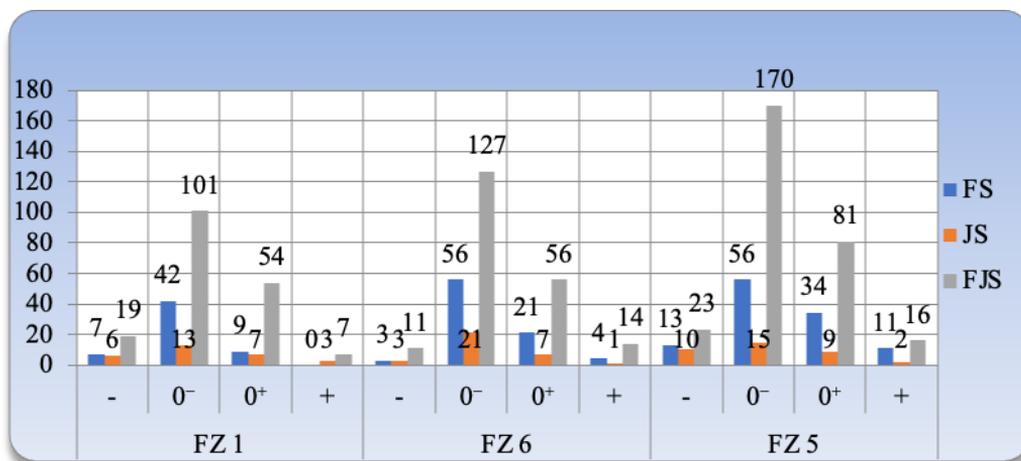


Figure 11 Comparative graph regarding the direction of service, type and quality (Division A1)

- the highest percentage of good quality takeovers were made from zone 6 (51% at the level of Division A2 and 49% for the services performed by CSU), coming as a confirmation due to the placement in the middle of the field of this zone;
- the highest percentage of aces made by CSU Oradea were made in zone 5 (19%), and as a method of execution, the service from the planned jump had the highest percentage (15% of the total FJS services, respectively 44 services).

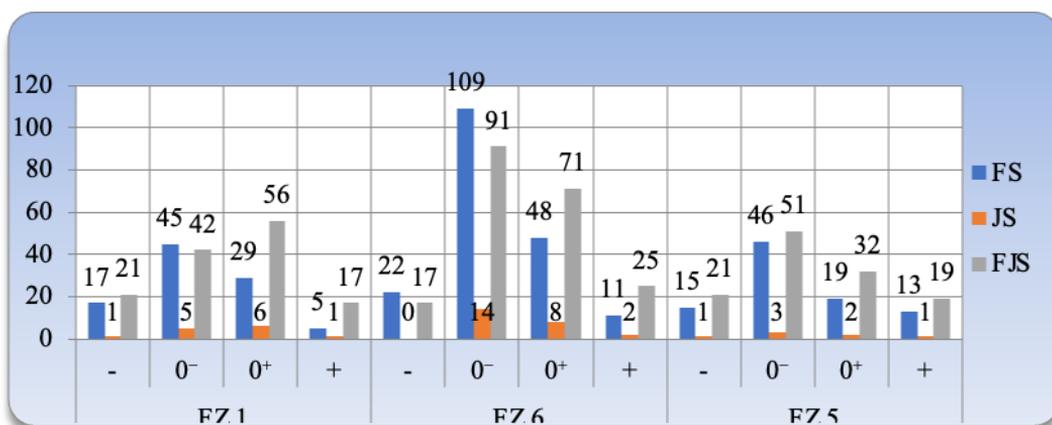


Figure 12 Comparative graph regarding the direction of service, type and quality (Divizia A2)

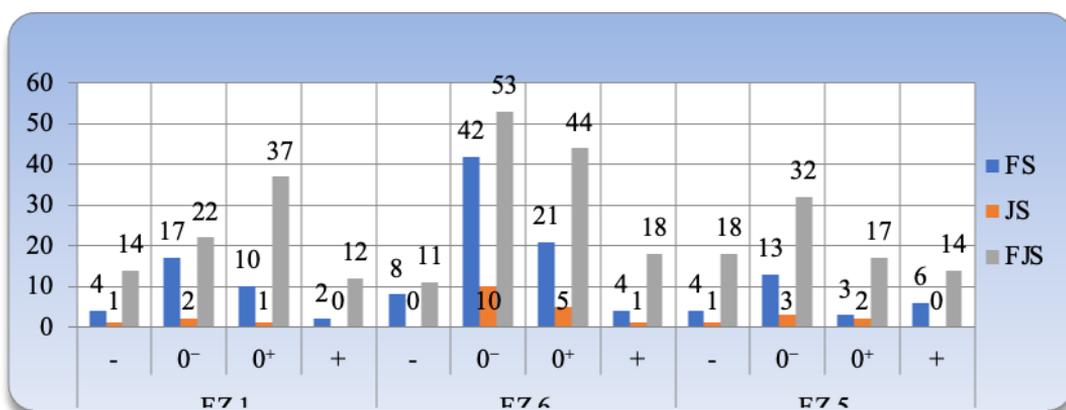


Figure 13 Comparative graph regarding the direction of service, type and quality (CSU Oradea)

From the results obtain after gathering all data in a centralizing table the distribution of services according to the area of their execution and direction, for each match, we can observe the following:

- compared to the results obtained at Division A level, for the teams in Division A2, including the team from Oradea, the services from zone 1 to the opposing zone 1 represent the greatest consistency, unlike the teams in the first echelon, for which services directed from zone 5 towards zone 6 they have the lowest standard deviation (3.7) and the highest degree of homogeneity (24%);
- both in Division A and A2, the highest average was achieved for the services performed in Z1. Regarding the area to which they were executed, in Division A the highest average (25.5) was achieved for the services executed from Z1 to Z5, and in Division A2, for the services from Z1 to Z6 (average of 25 services per match).

Table 5 Centralised data Division A2

Joc	FS				T	JS				T	FJS				T	Total
	-	0 ⁻	0 ⁺	+	FS	-	0 ⁻	0 ⁺	+	JS	-	0 ⁻	0 ⁺	+	FJS	
1	13	72	19	8	112	1	5	5	3	14	10	24	31	14	79	205
2	9	24	25	11	69	0	3	3	0	6	11	39	31	14	95	170
3	11	30	14	2	57	1	5	2	0	8	10	25	20	12	67	132
4	3	13	5	1	22	0	2	3	1	6	9	43	38	9	99	127
5	8	30	11	3	52	0	2	1	0	3	11	29	23	8	71	126
6	10	31	22	4	67	0	5	2	0	7	8	24	16	4	52	126
TOTAL	54	200	96	29	379	2	22	16	4	44	59	184	159	61	463	886
%	14%	53%	25%	8%	43%	5%	50%	36%	9%	5%	13%	40%	34%	13%	52%	100%
MIN	3	13	5	1	22	0	2	1	0	3	8	24	16	4	52	126
MAX	13	72	25	11	112	1	5	5	3	14	11	43	38	14	99	205
MED	9	33	16	4.83	63	0.3	3.67	2.7	0.67	7	9.8	30.7	26.5	10	77.2	148
STDEV	3.4	20.1	7.4	3.9	29.3	0.5	1.5	1.4	1.2	3.7	1.2	8.3	8.2	3.9	17.7	32.9
C.V	38%	60%	46%	80%	46%	155%	41%	51%	182%	50%	12%	27%	31%	39%	23%	22%

Table 6 Centralised data CSU Oradea

Joc	FS				TFS	JS				TJS	FJS				T	Total
	-	0 ⁻	0 ⁺	+	TFS	-	0 ⁻	0 ⁺	+	TJS	-	0 ⁻	0 ⁺	+	FJS	
1	3	26	10	4	43	1	4	2	1	8	4	13	21	10	48	99
2	1	11	9	5	26	0	1	1	0	2	9	27	22	12	70	98
3	4	8	4	2	18	1	5	5	0	11	9	12	16	9	46	71
4	2	8	2	1	13	0	1	1	0	2	4	23	11	3	41	56
5	3	12	3	0	18	0	1	1	0	2	10	17	20	8	55	75
6	3	7	6	2	18	0	3	1	0	4	7	15	9	2	33	53
TOTAL	16	72	34	14	136	2	15	11	1	29	43	107	99	44	293	452
%	12%	53%	25%	10%	30%	7%	52%	38%	3%	6%	15%	37%	34%	15%	65%	100%
MIN	1	7	2	0	13	0	1	1	0	2	4	12	9	2	33	53
MAX	4	26	10	5	43	1	5	5	1	11	10	27	22	12	70	99
MED	2.7	12	5.7	2.33	22.7	0.3	2.5	1.8	0.17	4.8	7.2	17.8	16.5	7.3	48.8	75.3
STDEV	1.0	7.1	3.3	1.9	10.8	0.5	1.8	1.6	0.4	3.8	2.6	5.9	5.5	4.0	12.7	19.8
C.V	39%	59%	58%	80%	48%	155%	70%	87%	245%	79%	37%	33%	33%	54%	26%	26%

From the data presented in tables no. 5 and 6 we can observe comparatively that the results obtained at the level of Division A, the highest average is also of the 0⁺ quality services executed with the FJS process, but we can observe a doubling of the average value of the 0⁺ quality services in the case of the FS process (16 compared to 8), also due to the higher share of this process in total services performed.

CONCLUSIONS

During the 6 matches, I watched 886 services (of which 452 were executed by the CSU Oradea team) in terms of the execution area, the area of its direction, the execution procedure and the quality of the service.

The teams in the second division of Romanian women's volleyball mainly opted for zone 1 as the service execution area (75% of the total services) and for zone 6 as its direction area (47%). The CSU Oradea team opted to perform most of the services also from zone 1 (69%) to zone 6 (48%). In comparison, at the women's division A level, the players opted in a smaller proportion (48%) for zone 1, directing the service predominantly (42.5%) to zone 5, an area from which the takeover is more difficult to reach the lifter (such as I concluded in the paper "Study regarding the analysis of the service in the female Division A").

The most used procedure in the service in the A2 division was the planned jump service (52%), and the least used, the force jump service (5%). The team from Oradea relied even more on the floating serve from the jump (64%). The results are a little different at the level of the first echelon, with the players serving more in force (9%), but also planing from the jump (66%).

A significant difference between the two divisions can be seen in the number of aces, but also in the wrong services. Thus, at the level of the A2 division, the percentage of aces made is double (13% for all services analyzed in the 6 matches and 11% for the CSU Oradea team) compared to the percentage of aces in the first echelon (6%). Also, the percentage of wrong services is higher in Division A2 (13%) and the team from Oradea (12%) compared to Division A women (9%).

For the team from Oradea, the services marked with 0⁺ (good quality) represented 31% of the total services, 12% less than the services that did not pose problems for the opposing takeover (0⁻). The weights are kept for all services analyzed, with small differences (30.5% - 0⁺ and 46% - 0⁻). Compared to the results obtained at the level of the first division (27% for the 0⁺ services and 58% for the 0⁻ services) we observe an increase (by 4%) of the services that posed problems for takeover and a decrease (by approximately 15%) of those that they did not pose any problems to the opposing takeover. This may translate into better service preparation for players in the first division, but also through the influence of more wrong serves at the second division level.

Most of the services performed by CSU Oradea, marked with 0⁺, were directed mainly to zone 1, being performed from zone 1, and the most used method was the service from the planned jump.

The least used service technique was the jump serve, with only 29 executions (6% of total services), unlike the teams analyzed in the first echelon, which opted for the JS service in 9% of cases. The jump serve can be very useful in increasing the defensive "conflict zones" for the purpose of directly scoring "aces", or to complicate the offensive game following the takeover of the serve.

There are several differences in the execution of the service between Division A and Division A2 women, both in terms of the execution process and in terms of the area from which the service is executed and the area to which it is directed, as I concluded following the interpretation of the results.

Following the interpretation of the results, we notice that zone 6 has the highest share of quality takeovers (48%, compared to 42% - Z5 and 34% - Z1), which shows that there is a significant difference in the reception of the service in the three zones from the second line; also, the services directed by the Oradea team to zone 1 generated the most weak executions (39%), compared to the services to zone 5 (19%) and zone 6 (32%).

The process of service execution may influence the quality of the reception; the FJS service generated more week executions (34%) than the FS process (25%), and the FS process generated more (53%) than the FJS process (40%), both for the CSU Oradea team, as well as for the A2 West Division average.

The inconsistency of the serve is closely related to the technique used by the players and the area in which it is directed. This is confirmed for the teams in Division A, but due to insufficient data regarding the JS procedure at the level of Division A2, we cannot conclude this hypothesis. Regarding the area where it is directed, the most mistakes at work were made in area 5 (20%), and the fewest in area 6 (9%).

The quality of services from the power jump was weaker in Division A2 than in the first league, the force impressed on the ball developing a lower speed (measurement was made with the help of PowerDirector 15 multimedia programs). Also, most of these services went to zone 6, an easier zone to pick up.

Aknowlegments All authors have equal contribution.

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