ORIGINAL

CONSTRUCCIÓN Y VALIDACIÓN DE UNA HERRAMIENTA DE ANÁLISIS OBSERVACIONAL EN FUTSAL (AOFS-I)

CONSTRUCTION AND VALIDATION OF AN OBSERVATIONAL ANALYSIS TOOL IN FUTSAL (OAF-I)

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ABSTRACT

The number of studies on goals and the analysis of how they are scored is increasing as they are considered to be the main indicator of futsal performance. Observational tools are changing including new variables that establish game patterns and that offer a better explanation to the internal logic of this sport. Thus, the creation and validation of an ad hoc observational tool in order to analyse offensive actions that end in goal is necessary.
This is a detailed, nomothetic and multidimensional study. Intervention is non-participative with a complete degree of perceptivity. Five experts took part in this process.

During season 14-15, 41 teams (16 Spanish, 11 Italian and 14 Russian) from the three main European leagues (240 Spanish league, 109 Italian league and 273 Russian league) performed 4716 offensive actions ending in goal in 622

matches. Footage of the football matches were provided by the different leagues via free internet platforms.

The Observational Analysis of Futsal (OAF-I) observational tool has passed all the necessary tests with regard to its reliability and validity obtaining figures greater than .85 and being organized into 26 criteria and 324 categories.

KEY WORDS: futsal, goal, observational tool

RESUMEN

El número de estudios sobre los objetivos y el análisis de cómo califican se están incrementando, ya que se consideran el principal indicador del desempeño de fútbol sala. Las herramientas de observación están cambiando, incluidas nuevas variables que establecen patrones de juego y ofrecen una mejor explicación de la lógica interna de este deporte. Por lo tanto, la creación y validación de una herramienta de observación ad hoc es necesaria para analizar las acciones ofensivas que terminan en el objetivo.

Este es un estudio detallado, nomotético y multidimensional. La intervención no es participativa con un grado completo de percepción. 5 expertos participaron en este proceso.

Durante la temporada 14-15, 41 equipos (16 españoles, 11 italianos y 14 rusos) de las tres ligas europeas principales (240 liga española, 109 liga italiana y 273 liga rusa) realizaron 4716 acciones ofensivas que terminaron en goles en 622 juegos. Las diferentes ligas proporcionaron imágenes de partidos de fútbol a través de plataformas de Internet gratuitas.

La herramienta de observación de Futsal Observation Analysis (OAF-I) ha superado todas las pruebas necesarias en cuanto a su confiabilidad y validez, obteniendo cifras superiores a .85 y organizadas en 26 criterios y 324 categorías.

PALABRAS CLAVE: futsal, objetivo, herramienta de observación.

1. INTRODUCTION

Futsal is a modern sport, with 7 World Championships organized by the International Federation of Association Football (FIFA) and 10 European Championships organized by The Union of European Football Associations (UEFA) (Lapresa, Álvarez, Arana, Garzón & Caballero, 2013). In 2006, FIFA and UEFA unified their regulations so domestic and international tournaments would follow the same rules in order to promote Futsal worldwide and exponentially increase the number of its participants (Sarmento et al., 2016). In Spain, futsal, with 129.334 federative licences in 2018, is the sixth most practised sport after football, basketball, hunting, golf and outdoor sports in nature (Licencias CSD, 2019). Currently, the two world powers are Brazil, with 5 World championships and Spain, with two. In Europe, Spain has won 7 out of

the 10 European Championships celebrated so far (Lapresa, Álvarez, Arana, Garzón & Caballero, 2013).

Due to the global professionalization of this sport, as well as the great physiological capacity and level of concentration that playing this sport at a high level requires (Álvarez, Corona, Giménez, Serrano & Manonelles, 2001; Álvarez, Giménez, Manonelles & Corona, 2002; Álvarez, Murillo, Manonelles & Giménez, 2014) national and international teams are becoming more and more balanced so the importance of analyzing and comprehending what takes place during competitions as well as studying opponents (known as scouting) is increasing in order to have advantage in the competition (Abdel-Hakim, 2014).

The process of training should establish individual and collective game patterns (Álvarez, Puente, Manero & Manonelles, 2004). Being able to predict these patterns is a great challenge when preparing matches for a competition (James, 2012). The number of studies on goals and the analysis of how each one is scored is increasing (Armatas & Yinnakos, 2006) as they are considered to be the main indicator of futsal performance. Offensive actions (OA) that end in goal determine the final result (Michaildis, Michaildis & Primpa, 2013), being the proficiency index their best predictor of performance (De Bortoli A.L, De Bortoli R & Márquez, 2001).

Scientific research that study OA that end in goal in futsal is scarce as opposed to football (Moore, Bullough, Goldsmith & Edmondson, 2014), hindering the comparison of results. This difficulty is enhanced by the fact that different methodologies, instruments and sampling such as specific teams, international tournaments or national leagues are used.
In relation to specific teams, Sarmento et al. (2016) studies a team from the Spanish first division league during the 30 matches of a season. Lapresa et al (2013) analyses the OA of the Spanish national team that end in a shot towards the goal in the 5 matches of the final round that took place in the 2010 UEFA Championship.

Regarding international tournaments, Armatas & Yiannakos (2010) analyse the goals in the final round in the 2006 World Cup. Michaildis et al. (2013) analyses the goals in 2012 Eurocup. Abdel-Hakim (2014) analyses the goals from the final round in 2002 and 2008 World Championships and establishes that the average of OA that end in goal per match is 6,71 and 6,91 respectively.

There is a lack of studies analyzing full seasons. Alvarez et al. (2004) analyse all the OA in the Spanish first Division that end in goal from season 2002-2003. Álvarez, Murillo & García (2015), compare how the changes FIFA made in the regulations in season 2006 has influenced the scoring of goals and its internal logic. Before this change, 1771 goals from season 2002-2003 were analysed as well as the 1355 goals scored after the change, from season 2013-2014. Álvarez, Murillo & García (2016) compare the OA that end in goal in season 2012-2013 containing 1094 goals and in season 2013-2014 containing 1355 goals. They also look for relations between the zone of shot-contact surface used-type of shot and type of action-number of passes-players involved as these actions prior to the action of shooting towards the goal are considered to

show a stable relation among themselves and therefore could be considered to enhance the possibility of carrying out a successful game. From his research he establishes that the average of OA that end in goal in the professional Spanish league is between 6.44-8 goals/match and 3.22 and 4 per team/match (Álvarez et al., 2004, 2015, 2016).

Observational tools ad hoc have been used in sports such as volleyball (Hileno & Buscà, 2012), badminton (Valldecabres, De Benito, Casal & Pablos, 2019), waterpolo (Sabio, Guerra, Cabedo, Sola, & Argudo, 2018) among others. In futsal, these instruments have also been used to analyse the OA that end in goal (Álvarez et al., 2004; Jonsson et al., 2006; Lapresa et al., 2013; Álvarez L, 2015). Álvarez et al. (2004) uses 6 criteria and 31 categories in his tool and Álvarez L (2015) in his thesis uses 7 criteria and 58 categories. Neither of them add new criteria such as: playing as visitors or local, obtaining the first goal, the moment of scoring a goal, temporal scoring, classification, etc., which are becoming more and more important as they are considered to affect the players mental state and the final result (Goumas, 2014) allowing a better understanding of the internal logic of this sport and establishing game patterns.

The absence of the criteria above mentioned in previous studies concerning futsal justify the need of this study and establishes its **object of study**; validate a useful observational tool in order to analyse offensive actions that end in goal in order to explain the internal logic of the game and establish effective offensive game patterns.

2. METHODS

2.1. Participants

During season 14-15, 41 teams (16 Spanish, 11 Italian and 14 Russian) from the three main European leagues (240 Spanish league, 109 Italian league and 273 Russian league) performed 4716 offensive actions ending in goal in 622 matches. Footage of the football matches were provided by the different leagues via free internet platforms.

The three best European leagues have been chosen according to their European titles, as they are considered to be the best reference to analyse the object of study. Spain has won 7 out of the 10 European Championship from 1996 to 2016, Italy has won 2 and Russia has one 1 (Lapresa et al., 2013).

2.2. Material

The tools used were:

- *Microsoft Office Excel 2010* software package for the questionnaire validation.

- Lince, version 1.2.1 was used to register and code the data. GSEQ, version 5.1 was used to obtain the coefficient Kappa de Cohen.

2.3. Procedure

In order to register the offensive actions from the matches of the three European futsal leagues, an ad hoc tool was designed combining different field formats and a category system, both of which were to present exclusivity as a requirement.

The analysis unit are the offensive actions that end in goal, based on the criteria of Pollard & Reep (1997). The OA starts when a player from the observed team (the attacker) takes the ball and controls it. The observational unit ends when the observed team scores the goal.

The tool, named Observational Analysis of Futsal (OAF-I) was formed by 26 criteria and 324 categories (Appendix 1).

The study was approved by the ethics board of the University of Zaragoza

2.4. Observational tool

The ad hoc observational tool presented in this study is detailed, nomothetic and multidimensional, non-participatory intervention and with a complete degree of perceptivity the design and construction process was carried out by 5 experts who met the following requirements:

- Own third level Futsal national Diploma and/or Degree in sport sciences with professional experience in observational analyses in futsal.

- Experience as coach or member of the technical team in the highest Spanish category for the last 5 seasons.

In order to estimate the quality of the data two observers with the following requirements have participated: own a degree in sport sciences and National Futsal Coach Diploma.

First, the observational tool was designed from previous studies (Lapresa et al., 2013; Álvarez et al., 2004, 2016; Álvarez L, 2015), combining different field formats and a category system. The content was validated by a group of 5 experts. They received the tool with a detailed description and a form for its analysis. The experts could choose the answers from a previously established list.

Following this step, the data was registered. Afterwards, the chosen observers were trained to verify the quality of the information. The training period was carried out in 3 stages. The first, a theoretical training, where the observational tool was introduced. The second, a theoretical and practical training, divided into 3 stages: first, the observer was presented with a goal and how to register it. Second, a different goal was shown and the observer registered it individually. That registration was discussed and the video of the complete

action was played. Third, 5 consecutive goals from each league we registered. After the exercises from each stage were over any possible doubts were solved. The third and final stage was the practical training, pilot test, in order to guarantee the reliability of the data collected during the registration process and the codification (Quera & Behar, 1997).

To establish the consistency between the observation two registration sessions were organized. In the first session, all the goals from the second match day from the different leagues to be analysed were registered and coded (Quera & Behar, 1997). The second session took place two weeks later where the same process was repeated. The correspondence between the results was calculated using a reliability index, with values higher than 0.91 in all the analysis guaranteeing the training process.

Finally, the concordance of all the observations was estimated. Three groups (B) of data were established:

- B-1 contains all the observational sampling.

- B-2 contains 10% of the registrations from each league.

- B-3 was obtained consultively (Arana, Lapresa, Anguera & Garzón, 2013) and contains only the OA in which some kind of discrepancy was detected between B-1 and B-2. B-3 allows for any weaknesses in the intraobserver´s concordance to be overcome. The observer had access to the same audiovisual material and tool but not to the discrepant registers with the purpose of reducing bias expectancy (Anguera, 1990).

2.5.   Statistical analysis

Frequency and percentage of observer's response were calculated. Kappa de Cohen values above .8 were set as adequate as established by Landis and Koch (1997).

3. RESULTS

The first stage of this research was building the observational tool "OAF-I". Following indications Haynes, Richard & Kubany, (1995), the first step when building an tool is to define the construct to be analysed , the criteria and categories that define the observational tool. A bibliographic review of the object of study was necessary in order to specify the components of this work (Carretero & Pérez, 2005). Once the bibliographic review was made in the database Web of Knowledge in 2016 the lack of studies related to the object of study was confirmed. Key words such as "futsal" obtained 219 results, "futsal & goal" obtained 31, "futsal and observational" obtained 9 results and "futsal and goal and observational" obtained only 2. All of them were revised to discover that most of them were related to physiological aspects, control over training load and epidemiological.

Following the usual procedure in this matter, a team of experts analysed the validity of the content obtained from the tool (Ding & Hershberger, 2002). It is understood that their judgment is an informed opinion as they are experienced in this field and are highly regarded by other experts as can provide information, evidence, judgments and assessments. Identifying these experts is crucial in this process and should meet several requirements (Skjong & Wentworht, 2000) such as training and experience. The experts chosen for this study meet these requirements that have been established in the inclusion criteria.

The tool was validated via a board of experts by the agreeing on the relevance of the different criteria and categories. The agreement reached by the experts over the criteria and categories were over 80% in all cases. Only 5 categories with the following three criteria did not reach 100% agreement from the experts (Table 1).

3.1.   Tool validity

Table 1. Criteria and categories that did not reach 100% agreement between experts.

Criteria	Category	Percentage
11: Type of play	Pressured structured defence	80%
14: End play	Clearance One-two Overlap	80%
17: Goal zone	Ground shot	80%

In order to determine the reliability of the data registered with the tool, the three groups of data (B-1, B-2 and B-3) were compared to each other (Table 2). Concordance in the observations related to B-1 and B-2 were positive for the Spanish and Russian league but not so for the Italian league (Table 2).

Table 2. Kappa Values data groups B-1 y B-2 from the three leagues.

League	Results		Agreement consideration
Spanish league	Kappa	0.96	*Almost perfect*
	Agreement	97%	
Russian league	Kappa	0.97	*Almost perfect*
	Agreement	97%	
Italian league	Kappa	0.79	*Subtancial*
	Agreement	80%	

As the results for the Italian league were not acceptable, the next analysis was performed to study the concordance between the observations in B-1 and B-3 and those in B-2 and B-3 (Table 3). Results show that the concordance is almost perfect in groups 1 and 3.

Table 3. Kappa Values data groups B-1 y B-3 and data groups B-2 y B-3 from the Italian league

Italian League	Results		Agreement consideration
B-1 and B-3	Kappa	1	*Almost perfect*
	Agreement	100%	
B-2 and B-3	Kappa	0.79	*Subtancial*
	Agreement	80%	

By using a second observer and creating the group B-3, weaknesses in the intraobserver´s concordance are overcome. Thus, demonstrating the quality of the information in B-1.

4. DISCUSSION

The aim and the importance of this study is to create and validate an "ad hoc" tool which offers precise, valid and reliable information useful for future studies related to futsal. Carrying out an observational register in team sports is not an easy task. The complexity is due to the speed of the different actions in the game, the area where the actions take place, the type of footage used for the registration, the high number of players that participate and certain problems related to the observability. (Castellano, Hernández, Gómez de Segura, Fontetxa, & Bueno, 2000)

The novelty related to futsal and its evolution (Lapresa et al., 2013; Álvarez et al., 2004, 2016; Álvarez L, 2015), led to the decision of building a new tool that could encompass all the new criteria and categories that could affect the players' mental state and therefore affect the final score of the match. Taking into account the tools used by Álvarez et al. (2004) with 6 criteria and 31 categories and other very similar ones used by Álvarez L (2015) with 7 criteria and 58 categories, a new sheet with 25 criteria and 324 categories is created (table 4).

Table 4. Observation Sheet evolution. Criteria used

CRITERIA	Álvarez J 2004	Álvarez L 2016	IOFS I
End zone	X	X	X
Body zone shot	X	X	X (taking laterality into consideration)
Type of play	X		X
Num.players	X		X
Num. passes	X		X
Game initiation after reglamentary interruption	X	X	X
Game initioan after interception	X	X	X
Initiation zone		X	X
Technical fundamentals used		X	X
Shot (consequence)		X	
League			X
Num. of play			X
Match day			X
Round (Russian league)			X
Headquarters			X
Position-type player			X
Num. of touches			
Goal zone (height ball pass)			X
Goal laterality (latitude ball pass)			X
Moment of goal (5' period)			X
Previous result			X
Locals temporal scoring from each goal			X
Visitors temporal scoring from each goal			X
Goal difference from each goal			X
Initial, half time and final result			X
Classification when round starts			X
Final classification when league ends			X

The results obtained with reference to the quality of the data are considered to be optimum. The Kappa de Cohen coefficient for each pair of groups from the observations performed was excellent in two of the leagues. In the case of the Italian league the procedure previously described for the creation of B-3 was necessary in order to overcome certain weaknesses in the concordance of the observer. The final results, all of them always above 0.8, follow the criteria established by Landis y Koch (1997), and prove the quality of the data obtained. The concordance of the observations has offered satisfactory results, allowing to think that the suggested system meets the methodological requirements in relation to reliability, accuracy and validity. The observational tool that has been created offers the possibility of analyzing the action of the game in futsal from a contextualized and sequenced perspective. From this study we can obtain possible practical applications that would allow us to determine which behavioral patterns are the most effective at a defensive and offensive level.

5. CONCLUSIONS

The observational tool Observational Analysis of Futsal (OAF-I), formed by 25 criteria and 324 categories, has passed all the necessary tests regarding its

reliability and validity (with values above 0.85) for the analysis of offensive actions that end in goal in futsal.

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APPENDIX 1

Due to its length, the tool is presented only with its criteria, without definitions, and the number of categories it is divided into.
Another criterion, called season, should be added to the 26 existing ones.

1. Number of action 1, 2, 3…n
2. League (3)
3. Match day (30)
4. Round. Only in Russian league (2)
5. Overlap
6. Headquarters (2)
7. Position-type player (5)
8. Initiation zone (26)

9. End zone (26)
10. Way play is initiated (16)
11. Type of play (9)
12. Players who touch the ball (5)
13. Number of passes (11)
14. End play. Technical-tactic action (12)
15. Number of times the ball is touched (11)
16. Contact surface (14)
17. Goal zone (3)
18. Goal laterality (3)
19. Moment of goal (10)
20. Previous result (3)
21. Locals temporal scoring from each goal (13)
22. Visitor temporal scoring from each goal (13)
23. Goal difference from each scored goal (31)
24. Initial, half time and final result (7)
25. Classification when match day starts (16)
26. Final classification when the league ends (16)

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