



## DETERMINATION OF OFFENSIVE COEFFICIENTS IN HIGH PERFORMANCE FUTSAL

Werlayne S. S. Leite

*Secretaria de Educação do Estado do Ceará, Fortaleza, BRAZIL.*

**Abstract** The aim of this study was to propose indicator parameters that can help in better understanding of the offensive processes in high performance futsal, namely: the Offensive Production Coefficient (OPC), the Finalization Efficiency Coefficient (FEC) and Finalization Effectiveness (FE). We analyzed the final of the UEFA Futsal European Championship 2010 between Portugal and Spain. The methodology used was the descriptive observational analysis and the data collection was conducted through structured spreadsheet. The results showed that the OPC of the Spanish team was 55.88%, while the OPC of the Portuguese team was 35.48%. In relation to the FEC, in this game, the Portuguese national team achieved a utilization of 51.51%, while the Spanish team got an FEC of 43.86%. Regarding FE, the Spanish team achieved a utilization of 16%, while the Portuguese national team obtained an FE of 11.76%. Spain was the most efficient selection for the game, being superior in all items analyzed in this study (with the exception of FEC). The OPC and the FEC parameters are indicators that can help in the planning of training and competition. One cannot say that the team with best indicators is the winner, due to the unpredictability of the game. However, the final result of the game will always be conditioned by FE.

**Key words:** Finalization, collective efficiency, offensive processes, futsal

### INTRODUCTION

According to Bayer (1994 as cited in [6]) futsal can be classified as Collective Sport or Collective Sports Game of invasion that has operating principles, which are divided into three principles of defense and three of attack. The principles of defense are: ball recovery, preventing the progression of the opposing team and protecting its own target. The principles of attacks are: keeping the ball possession, progression towards the opponent target and finalization seeking the score or goal.

Among the operational principles of attack, finalization is emphasized, because it is important to identify how and what way the finalizations occur in a futsal match. Therefore, the finalization, while offensive action which nurtures the teams to complete successfully the main objective of the game, the goal, and the situations in which teams can make the moves finalizations, become important variables of the study [4].

The objective of this study is to contribute to the development of research on the analysis of futsal game, allowing to establish parameters, indicators and relations between the offensive actions of a team, including: the Offensive Production Coefficient; the Collective Efficacy Coefficient; and the Collective Efficiency.

The collective efficacy in game situation is usually expressed by the offensive and defensive efficacy. In futsal, offensive efficiency is associated with the ability of teams to convert goals, whereas defensive effectiveness is associated with the ability of teams to prevent conversion of their opponents goals (Salgado, 2004 as cited in [2]).

According to Duarte [2], we suggest the concept of collective efficiency, since it can help to characterize the team's offensive and defensive processes and can be measured as an indicator of a procedural trend of game in futsal. The collective efficiency can be defined as the relation of attempts/finalizations possibilities and the realized finalizations. The collective efficiency on the attack was analyzed through a set of indicators that helped to analyze the use of Ball Possession (BP) in the attack, the number of passes made during the actions, of Ball Possession with Finalization ( $BP_{withF}$ ) and Ball Possession without Finalization ( $BP_{withoutF}$ ), the total number of finalizations, the number of Correct Finalizations (CF) and goals scored.

It is intended to propose three relationships that can assess the efficiency of processes on offensive and defensive (of the opposing team) in futsal, the Offensive Production Coefficient (OPC), the Finalization Efficiency Coefficient (FEC), Finalization Efficacy (FE). The OPC expresses the relationship between the  $BP_{withF}$  and the total number of BP, the FEC expresses the relationship between Correct Finalizations (CF) and  $BP_{withF}$  [2], FE expresses the relationship between the Goals scored and CF.

$$\begin{aligned} OPC &= [BP_{withF} / (BP_{withF} + BP_{withoutF})] \times 100 \\ FEC &= [CF/BP_{withF}] \times 100 \\ FE &= (Goals/CF) \times 100 \end{aligned}$$

**Figure 1.** Equations of Offensive Production Coefficient, Finalization Efficiency Coefficient and Finalization Effectiveness

## METHODS AND MATERIALS

### SAMPLE

We analyzed the final game of the UEFA Futsal European Championship 2010 in Hungary. The game was played between the teams of Portugal and Spain.

### DATA COLLECTION

For the analysis of the game, footage on DVD was used (Cyber, DVD+R, 4.70 GB); the match was recorded from the official TV station broadcasting the event (EUROSPORT 2). The data were collected through structured spreadsheet.

### APPLIED METHOD

The methodology used for this study was the observational descriptive, defined by Anguera (1988 as cited in [5]), as the procedure destined to articulate a deliberate perception of reality manifests, with its proper interpretation, capturing its meaning, so that, through a recorded objective, systematic and specific of the behavior generated in a spontaneous way in a given context, and once submitted to an appropriate coding and analysis, providing us valid results within a specific boundary of knowledge.

To study the importance of specific tactical and technical parameters to a sportive modality, coaches recourse to the observation area or game analysis [4]. Nowadays, the use of observational methodology in the study of collective sports is a consolidated reality. The rigor, systematization, flexibility and capacity to be used in situations of greater complexity, have enabled that in the last few years this methodology has been turned into a procedural and compulsory way to study of sport in context competitive [1].

The observation or analysis of the game is a selective and planning perception process, which may occur before, during or after running the matches, which results in attitude records of participants toward game situations (Carling et al., 2005; Greco et al., 2000 as cited in [4]). Different stages constitute the process of game analysis, among them the observation of events, the collection and data interpretation [3]. The data interpretation allows us to evaluate the organization of teams and the actions in the competition; planning and organizing the training and work strategies, establish appropriate tactical-technical plans for a particular opponent; and regulate the teaching-learning-training (Garganta, 1998 as cited in [4]).

### DATA ANALYSIS

We analyzed all finalizations, of the Portuguese team and of the Spanish futsal team during the game, to verify the OPC, the FEC and FE. The images were analyzed first with normal transmission speed. Soon after, every play was revised at the slower speed (1/2, 1/4 or 1/8 of normal speed) for better accuracy the type of action, tactical movement of players, ball trajectory and finalization of moves. For the presentation of results we used descriptive statistics, consisting of frequency distribution.

### DEFINITION OF PARAMETERS

In order to increase the reliability of the observation, we defined the concepts that support this inquiry.

#### Ball Possession (BP)

Technical-tactical uninterrupted and complete control of the ball. To consider that the BP changes to the other team it is necessary for the opposing team (who recovered the ball) to run 1 pass, 1 finalization or has its control for 2 seconds. When a team tries to make a pass and the ball is partially intercepted by the

opponent, a fault occurs, the ball is deflected for a side throw or corner throw, it was considered a throw-in play as a continuation of the same offensive sequence. Thus, all attack rolls relating to the continuation of previous offensive sequence are considered an extension of previous BP.

### Ball Possession with Finalization (BP<sub>withF</sub>)

All BP ending in finalization actions, that means, actions of finalizations developed with the intention of making immediate goal. Upon such a finalization, if a certain team continue with BP (as in a shot saved by the opposing goalkeeper and the team getting a throw of the corner), the continued offensive action was considered as a different action, given that an action of finalization has occurred.

### Ball Possession without Finalization (BP<sub>withoutF</sub>)

All BP that do not end in finalization actions, occur when there is a resumption of BP by the opposing team.

### Number of passes with the Ball Possession

Number of passes made by the team that holds the BP.

### Number of Correct Finalizations (CF)

Number of finalizations directed to the perimeter of the goal, they are the submissions defended by the goalkeeper, that reach the beacon goal (including the goalposts) and goals scored.

### Number of Wrong Finalizations (WF)

Number of finalizations not directed to the perimeter of the goal, they are the submissions that go out or finish intercepted by the opposing team.

### Number of intercepted finalizations

Number of finalizations when the finalization of a team occurs and the ball is intercepted (intentionally or accidentally) by the opposing team. For this kind of finalization it is also considered the finalization where the ball kicked countered the opposing player and went out of the court, in side throw or corner throw. In this case, it is considered a BP<sub>withF</sub> which resulted in intercepted finalization, and then it is considered the start of a new BP.

### Goals

Number of finalizations that end in scored goals.

### Unaccounted ball possession

Due to submit bids of the game, in the form of replays, by the television station that broadcasted the event, some actions were not considered because it is not possible to identify them accurately. Throughout the game, there were 11 unaccounted actions, 7 of Portugal and 4 of Spain.

## RESULTS

Analyzing the total actions with BP of the two teams (Table 1), it was found that the Portuguese national team had a total of 93 BP, 60 (64.52%) were BP<sub>withoutF</sub> and 33 (35.48%) were BP<sub>withF</sub>. The Spanish team had a total of 102 BP, 45 (44.12%) BP<sub>withoutF</sub> and 57 (55.88%) of BP<sub>withF</sub>.

**Table 1.** Relation between the Ball Possessions with and without Finalizations

	BP <sub>withoutF</sub>		BP <sub>withF</sub>	
	Portugal	Spain	Portugal	Spain
1 <sup>st</sup> half	31	17	11	35
2 <sup>nd</sup> half	29	28	22	22
Total	60	45	33	57

Analyzing the total number of passes made by the two teams (Table 2), it was found that the Portuguese team performed, in the actions of BP<sub>withoutF</sub>, a total of 60 passes at 330 BP having an average of 5.5 passes/BP. When analyzing the number of passes made on the actions of BP<sub>withF</sub>, the Portuguese national team performed a total of 188 passes in 33 BP, with an average of 5.7 passes/BP. The Spanish team performed, in BP<sub>withoutF</sub>, a total of 205 passes in 45 BP, with an average of 4.5 passes/BP. In BP<sub>withF</sub>, 242 passes were performed in 57 BP, with an average of 4.2 passes/BP.

**Table 2.** Relation between the number of passes and Ball Possessions with and without Finalization

	BP <sub>withoutF</sub>		BP <sub>withF</sub>	
	Portugal	Spain	Portugal	Spain
Total	60	45	33	57
Number of passes	330	205	188	242
Average	5.5	4.5	5.7	4.2

Regarding BP<sub>withF</sub> and results in these actions (Table 3), it was found that the Portuguese national team scored 2 goals, it had 14 finalizations defended by the opposing goalkeeper, one finalization on the goalpost, there were 7 finalizations out and 9 intercepted finalizations. The Spanish team scored 4 goals, it had 19 finalizations defended by the opposing goalkeeper, 2 finalizations on the goalpost, 17 finalizations out and 15 intercepted finalizations.

**Table 3.** Relation between the Ball Possessions with Finalization and the results obtained in the actions

	BP <sub>withF</sub>	
	Portugal	Spain
Scored goals	2	4
Defended finalizations	14	19
Finalizations on the goalpost	1	2
Finalizations out	7	17
Intercepted finalizations	9	15
Total	33	57

When analyzed only the BP<sub>withF</sub> (table 4), Portugal held a total of 33 finalizations, 17 correct finalizations (CF) and 16 wrong finalizations (WF). Spain held a total of 57 finalizations, 25 CF and 32 WF. Dividing the BP<sub>withF</sub> by game time, the Portuguese national team performed 6 CF and 5 WF in the first half of the game, and 11CF and 11 WF in the second half of the game. The Spanish team performed 14 CF and 21 WF in the first half of the game, and 11CF and 11 WF in the second half of the game.

**Table 4.** Relation between the Correct Finalizations and the Wrong Finalizations and the two halves of the game

	BP <sub>withF</sub>		CF		WF	
	Portugal	Spain	Portugal	Spain	Portugal	Spain
1 <sup>st</sup> half	11	35	6	14	5	21
2 <sup>nd</sup> half	22	22	11	11	11	11
Total	33	57	17	25	16	32

## DISCUSSION

### USE OF BALL POSSESSION

Analyzing the total of actions with BP (Table 1), the Portuguese national team had a total of 93 actions, while the Spanish team had 102 actions. When analyzing the obtained results at the conclusion of the BP, the Portuguese national team had 60 actions that resulted in BP<sub>withoutF</sub> and 33 actions resulted in BP<sub>withF</sub>. While the Spanish team had 45 actions that resulted in BP<sub>withoutF</sub> and 57 actions that resulted in BP<sub>withF</sub>. The indicators showed that Spain had the best result in the total actions with BP, in the bigger quantity of BP<sub>withF</sub> and in the smaller quantity of BP<sub>withoutF</sub>.

Analyzing the BP with and without finalization and the number of passes made on each type of action (Table 2), Portugal had an average of 5.5 passes in the BP<sub>withoutF</sub> and an average of 5.7 passes in BP<sub>withF</sub>. Spain has an average of 4.5 in the BP<sub>withoutF</sub> and 4.2 passes in BP<sub>withF</sub>, always having a smaller number of passes, both in the BP<sub>withoutF</sub> as BP<sub>withF</sub>. According to the analysis of the game and the relationship between the amount of BP and the number of passes made by the two teams during the actions, we can conclude that Spain favors a faster and objective method of attack than Portugal, seeking the finalization of actions more dynamically. On the other hand, the Portuguese national team, aside from performing its actions more slowly and with more passes, also showed a lack of objectivity in some actions. This lack of objectivity was because Portugal performed many passes in the center of the court and sometimes did not manage to make a finalization, because the BP was lost through catching the ball by Spain or the execution of wrong pass.

We can conclude that, compared to Spain, Portugal promotes a more intense game of passes to try to approach the center of the game's finalization zone. However, due to opposing defensive quality, there is a large amount of BP<sub>withoutF</sub>. This fact shows good concentration and collective defense of the Spanish players. The results also show that the use of offensive actions more quickly and objectively may be an important aspect in the organization of the Portuguese national team game, however, the segment of the training regarding these strategic situations should be strengthened.

To relate the Ball Possessions with and without Finalizations, we propose offensive production coefficient (OPC), which establishes the relationship between the total number of BP<sub>withF</sub> and the total number of BP, expressed by the following equation:

$$OPC = [ BP_{withF} / (BP_{withF} + BP_{withoutF}) ] \times 100$$

Thus, for the Spanish national team we have:  $OPC = [57 / (45 + 57)] \times 100 = 55.88\%$ . To the Portuguese team we have:  $OPC = [33 / (60 + 33)] \times 100 = 35.48\%$ . According to the result obtained with the OPC, we can conclude that Spain was the most efficient team during the game, because it has a better use of Ball Possession. Spain managed to create an amount of Ball Possession that resulted in more finalizations than Portugal, 55.88% against 35.48%, respectively.

### FINALIZATION EFFICIENCY COEFFICIENT

Regarding the results obtained in BP<sub>withF</sub> (Table 3), the results showed that Spain was superior in all analyzed items. By presenting a number of BP<sub>withF</sub> approximately 42% larger than Portugal, it is normal that Spain was superior in all results, including WF (finalizations out and intercepted).

When analyzed BP<sub>withF</sub> and the differentiation of these actions in CF and WF (Table 4), Spain again showed greater use or even an equal use in practically all items analyzed: number of BP<sub>withF</sub> in the 1<sup>st</sup> half of game, in the 2<sup>nd</sup> half of game and in total, number of WF in the 1<sup>st</sup> half, in the 2<sup>nd</sup> half and in total, number of CF in the 1<sup>st</sup> half, in the 2<sup>nd</sup> half and in total time of the game.

Analyzing two separate times, in the 1<sup>st</sup> half of the game Spain was far superior to Portugal on all items analyzed: the BP<sub>withF</sub>, in CF, and also in WF. That's one of the reasons that may explain the score at the end of the 1<sup>st</sup> half of the game, when Spain won partially finished at 2 - 0.

In the 2<sup>nd</sup> half of the game, there was a considerable improvement in indicators of the Portuguese futsal team. This fact can be explained by the momentary disadvantage on the scoreboard, because in the 2<sup>nd</sup> half of game Portugal should have tried to recover the unfavorable score. Analyzing the indicators of the 2<sup>nd</sup> half of the game, we can see that the final numbers of Portugal and Spain are exactly the same: the BP<sub>withF</sub>, in the CF and WF. This equality in all indicators can be one of the factors that may explain the equality also occurred in the number of goals scored by the two teams, 2 by Portugal and 2 by Spain, ending the game 4-2 for Spain.

In order to evaluate the efficiency of the actions of finalization, it is proposed that the Finalization Efficiency Coefficient (FEC), which relates the number of Correct Finalizations (CF) with the number of BP<sub>withF</sub> expressed by the following equation:

$$FEC = [CF/BP_{withF}] \times 100$$

Thus, for the Spanish national team we have:  $FEC = [25/57] \times 100 = 43.86\%$ . For the Portuguese team we have:  $FEC = [17/33] \times 100 = 51.51\%$ . In this indicator, the Portuguese national team had higher efficiency than the Spanish national team, with better use of CF in BP<sub>withF</sub>.

### FINALIZATION EFFICIENCY

To evaluate the efficacy of hits in the Correct Finalizations, it is proposed the Finalization Efficacy (FE), concerns the relationship between the amount of goals scored and CF that is expressed by the following equation:

$$FE = (Goals/CF) \times 100$$

Thus, for the Spanish national team are:  $FE = (4/25) \times 100 = 16\%$ . For the Portuguese national team are:  $FE = (2/17) \times 100 = 11.76\%$ . Thus, we can conclude that 16% of Spain's CF resulted in goals scored, while 11.76% of the CF of Portugal team resulted in goals.

### CONCLUSION

According to the analyzed items, Spain was superior to Portugal in almost all items. Regarding the proposed indicators, Spain was higher in OPC. Thus, the Spanish team had a better use in their offensive actions, since all its BP, 55.88% resulted in finalizations. Portugal had an OPC of 35.48%.

In relation to the FEC, Portugal had an efficiency of 51.51%, while Spain had a FEC of 43.86%. This was the only indicator in this study in which Portugal was superior to Spain. We can conclude that of all  $BP_{withF}$  realized by the 2 teams, the Portuguese national team had more correct finalizations than the Spanish team.

The OPC and the FEC are offensive indicators parameters that can help in a better understanding of the dynamics of futsal, it also helps to analyze possible deficiencies and assist in the planning of training and competition. We cannot say that the team that holds these indicators will be the best team and win the game, because the futsal game depends on a very important factor, unpredictability. But the team that has these superior indicators tends to be more likely to win. However, the final result of the game will always be conditioned by the Finalization Efficacy of the team, this is a determining factor.

The unpredictability of the game does not allow to collect data on the finalization efficacy before the goals happen. Furthermore, these indicators of efficiency offensive process do not depend on the existence of unpredictability of the goal. Thus, its use seems pertinent to the understanding of teams processes of game. However, further studies are needed to prove the usefulness of the information that these coefficients can transmit to the technical teams. If this is confirmed, the future may involve the provision of this data to the coach during the game [2].

## PRACTICAL APPLICATION

The futsal is a sport that, in the last decade, has achieved a significant breakthrough in the scientific aspects, and that requires further professional research and constant updating. Thus, this research is justified in terms of collaborating to learn more about the internal futsal dynamic, from a strategic perspective, identifying its peculiarities and therefore, pointing out indicators which can serve in the training plan and the regulation of the competition (Garganta, 2000 as cited in [7]). Another aim is that the results found may have implications in the improvement of futsal training process.

## REFERENCES

1. Anguera, M. T. (2009). Los deportes de equipo estudiados desde la metodología observacional: diferentes perspectivas de la misma realidad? In: *Proceedings of the II Congreso Internacional de Deportes de Equipo - II CIDE*, Coruña: Universidad de Coruña, 32-39.
2. Duarte, R. (2008). Análise da utilização da posse de bola durante o processo ofensivo no futsal: contributo para a determinação da eficiência colectiva. *Revista Motrivência*, 4 (2), 77-82.
3. Garganta, J. (2001). A análise da performance nos jogos desportivos: revisão acerca da análise de jogo. *Revista Portuguesa da Ciência do Desporto*, 1 (1), 57-64.
4. Irokawa, G. N., Lima, M. R., Soares, V., Aburachid, L. M., Souza, P. R., & Greco, P. J. (2010). Caracterização das circunstâncias e setores de finalização do jogo de futsal: um estudo da fase final da copa do mundo de futsal - FIFA 2008. *Revista EFDeportes.com*, 15 (144). Retrieved from <http://www.efdeportes.com/efd144/setores-de-finalizacao-do-jogo-de-futsal.htm>.
5. Lapresa, D. (2009). Hacia una optimización del modelo de competiciones en fútbol. In: *Proceedings of the II Congreso Internacional de Deportes de Equipo - II CIDE*, Coruña: Universidad de Coruña, 167-177.
6. Morato, M. P. (2004). Treinamento defensivo no futsal. *Revista EFDeportes.com*, 10 (77). Retrieved from <http://www.efdeportes.com/efd77/futs.htm>.
7. Santana, W. C., & Garcia, O. B. (2007). A incidência do contra-ataque em jogos de futsal de alto rendimento. *Revista Pensar a Prática*, 10 (1).

*Address for correspondence:*

WERLAYNE STUART SOARES LEITE  
Secretaria de Educação do Estado do Ceará – SEDUC  
Secretaria Municipal de Educação – SME  
Fortaleza,  
BRAZIL  
**E-mail:** [werlaynestuart@yahoo.com.br](mailto:werlaynestuart@yahoo.com.br)

