

Analysis of Small Game Areas of 4Vs4 and 7Vs7 in Spanish Professional Football

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Abstract: The aim of this study was to analyse the reduced space game situations that appear during competition in soccer considering interactions with a small number of players involved. The Amisco system was employed to collect the dimensions of playing areas of different situations from competition in order to extrapolate the results to the appropriate training drills design in reduced space. 8,727 4v4 and 7v7 game situations were collected for the study. Width, length and individual playing area were registered from these situations. The influence of the zone of the pitch in the configuration of these spaces was also considered. The results showed that the dimensions of the areas designed for training drills are larger than those in competition. The influence of the zone of the pitch is also significant, mainly in 4v4 situations. This should be considered to adjust the training drills design depending on the intended tactical aim, directly associated with the zone of the pitch where the training drill is developed.

1 INTRODUCTION

Small-sided games (SSGs) are considered as modified training drills developed in limited areas. SSGs frequently have adapted rules and the participation of fewer players than in a usual soccer match (Hill-Haas, Dawson, Impellizzeri & Coutts, 2011). They are currently an appropriate way for improving technical and tactical abilities besides player's physical performance (Fradua et al, 2013). SSGs are employed widely abroad and constitute the basis for many development programmes in soccer (Fradua, Zubillaga, Ruiz-Ruiz, Caro & Fernández-Navarro, 2012).

Previous research addressed the evaluation of game situations in reduced space and identified two different aspects. Many studies were associated with the analysis of SSGs during training to know the physical demands of different training drills and the benefits from the conditional scope (Casamichana & Castellano, 2011; Hill-Haas et al, 2011; Hill-Haas et al., 2009; Hoff et al., 2002; Köklü, 2012; Little, 2009). On the other hand, other studies focused on motor behaviour analysis and technical abilities of the game (Bekris et al., 2012; Dellal et al., 2013; Jones & Drust, 2007; Katis & Kellys, 2009; Kelly y Drust,

2009). All the studies showed game situations during the training session with reduced spaces and a small number of players, and therefore tried to determine the physical, technical and tactical demands in SSGs.

SSGs have the characteristics present in a soccer match and therefore players experience the situations that they find in competition, or similar to them (Owen, Twist & Ford, 2004). SSGs include elements from match play and possess their own complexity (Morin, 1998), consequently they are suitable for learning and acquiring technical and tactical skills (Parlebas, 2001).

Learning through SSGs is determined by different variables (Little, 2009). Number of players involved, playing area, and individual playing area are the decisive aspects. Previous research suggested playing area dimensions for different options of interaction in reduced space. These suggestions are justified by the conditional or tactical load attempted.

Whereas previous studies stated the specificity of SSGs, none of them provided justification for the dimensions of the space suggested based on the analysis of competition (Fradua et al., 2013). For this study, the dimensions of the areas are considered as the most important aspect for training drills, and if the aim is to develop specific training drills the dimensions of

the area suggested should be similar to the one in competition. Mainly, the individual playing area (IPA) that represents the *value of the area as the relationship between the total area of the pitch and the total number of players involved in the game* (Parlebas, 2001), because this determines the difficulty of the training drill for the player.

The influence of the zone of the pitch as a *performance indicator* (Reina Gómez & Hernández-Mendo, 2012) was previously analysed in relation to the areas for game situations (Fradua et al., 2013; Zubillaga et al., 2013). Different zones of the pitch depending on the tactical aims and the phases of the game can be considered to show a practical justification of the results of this study (Garganta, 1997; Díaz- Díaz, 2011)

During a soccer match, numerous situations and actions directly involve the nearest players to the player in possession of the ball. The positioning of these players, especially adversaries, determines that such actions will be reduced in space and time (Vilar et al., 2013). These competitive situations justify the use of the widely discussed training drills in small space or small-sided games (Hill-Haas et. al., 2011). Previous studies (Fradua et. al., 2013; Zubillaga et. al., 2011) utilised a novel procedure to analyse competition for the subsequent design of the training drills with similar characteristics of depth, width and individual playing area. This study aims to describe the reduced space situations of 4v4 and 7v7 that appear in soccer match play and to analyse the influence of the pitch zone in the variables measured.

2 METHODS

A multiple-camera player tracking system (AMISCO Pro, Nice, France) was used to record the playing area of these situations of 7vs7 and 4vs4. A total of 25 matches, 5 per team, of the 1st Spanish Division were analysed. Pitch Zone, Player's position and movements were registered with a frequency of twenty-five records per second (Zubillaga et al., 2007). A total set of 8727 data were collected, all of them in possession phases of the game. Records where the ball was out of play were removed. Data were recorded at intervals of 5 seconds and the pitch was divided in six zones (figure 1).

For data collection of the 4v4 and 7v7 situations, the 8 and 14 nearest players to the ball determine the four limits of the playing area considered. The cases where the nearest players to the ball do not allow an equal distribution of 4 or 7 players per team, e.g. a fifth player from one team should be taken in the area

of selection to obtain the fourth player of the opposite team; were not considered for data collection (Figure 2).

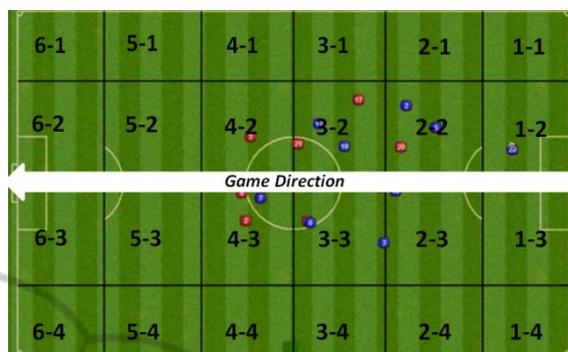


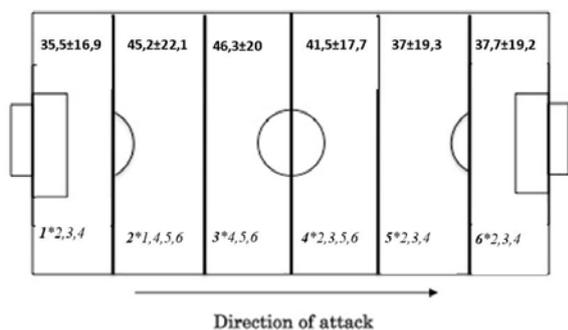
Figure 1: Schematic Representation of the Six Zones Used in the Analysis. All Zones were Determined Using Athletic Mode AmiscoPro® (Nice, France).



Figure 2: Playing area selection AmiscoPro® (Nice, France). 4vs4.

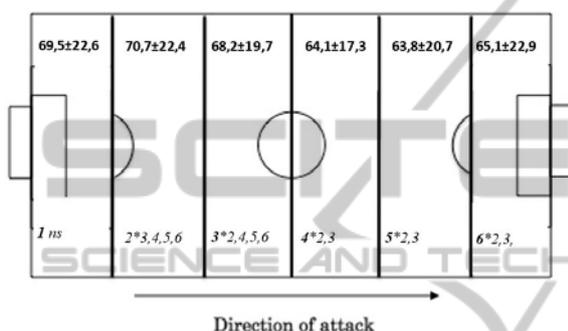
3 RESULTS

The analysis of variance (ANOVA) showed that depth is lower than width in all the pitch zones and for both situations. The mean depth and width was 27.74 m and 32.15 m respectively for 7v7, and for 4v4 the mean depth was 16.34 m and the mean width was 19.08 m. Significant differences ($p < 0.05$) were found in these values depending on the pitch zones where the action occurs. With the two variables (width and length) we can obtain directly the third one, the Individual Playing Area (IPA). This is the most important data to analyse the different demands that the SSG can generated in the players. For this reason we put focus in the results and discussion of this paper in that.



* $p < 0,001$

Figure 3: IPA 4vs4 SSG during competition.



* $p < 0,001$

Ns Without Differences

Figure 4: IPA 7vs7 SSG during competition.

4 CONCLUSIONS

The results from the analysis of the competition showed that the mean dimensions of the 4v4 playing area during match play were smaller than the dimensions presented in previous research (Aroso et al, 2004; Casamichana & Castellano, 2010 & 2011; Coutts et al., 2009; Dellal et al., 2008; Fanchini et al., 2011; Hill-Haas et al., 2008 y 2009; Jones & Drust, 2007; Little & Williams, 2006 & 2007; Mohammad et al., 2011; Owen et al., 2004; Rampinini et al., 2007; Sjökvist et al., 2011; Williams & Owen, 2007). Mean dimensions of 16.34 m long and 19.08 m wide that consequently generate an IPA of 42.38 m² showed a considerable dimension reduction in comparison with previous research. Thus, considering the results of this investigation, training drills suggested in previous studies related with SSGs could consider a reduction in the 4v4 area to analyse this specific situation derived from competition. Nevertheless although these dimensions were obtained from the analysis of the competition; the aim of training, level of players, or their learning age could be also determining for the

adaptation of playing area suggested from this study (Vilar et al., 2014).

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The influence of the zone according to the playing area was significant, especially in 4v4 situations where the results are more easily identifiable with the tactical objectives of each zone of the pitch, both in width and length. The zones that do not present differences between playing areas are zone 1 with zone 5 and 6, and zone 2 with zone 3. Density of players is higher in zones near to the goals (zones 1 in relation with the defended goal; 5 and 6 in relation with the attacked goal) moreover the main aim of the defensive team is to prevent from scoring and the overcoming of their own defenders, reducing the distance from the attacking players. Hence, this explains that length in zones 1, 5 and 6 were the lowest of all the zones. These zones also presented the lowest IPA values, thus confirming the increased time and space demands for players in these zones.

The 7v7 situations have not been analysed in previous research and their analysis can be considered important due to 7-a-side soccer is the competition format established in several countries for the first years of competition in youth soccer.

The 7v7 game situation presents results less related with specific tactical behaviours of each zone of the pitch. Only significant differences appear between the dimensions of playing area in zones 2 and 3, both associated with the beginning and organisation of the attacking phase. When comparing 7v7 with 4v4 it can be stated that in the 4v4 situation players are closer to the ball and this is associated with tactical behaviours of each zone in the pitch. On the other hand, the separation of the players around the ball in 7v7 situation and the low participation and influence of the players away from these 14 players, could determine the difficulty in explaining the results obtained. In a 4v4 situation the IPA is reduced in zones 1,5 and 6 as a result of the higher density of players associated with the reduction of space, nevertheless in 7v7 situation this trend did not appear. In zones of the pitch associated with finishing and individual marking, playing actions are performed by a smaller number of players. Therefore, although in the selection of the 7v7 playing area the 14 players closest to the ball are included, it is possible for players further away from those 14 to have little or no participation at the moment recorded.

Besides the difference in the influence of the zone of the pitch in playing area in each of the two

situations analysed, we can see that it is not possible to establish a proportional relationship in playing areas for the different game situations. In a previous study, Fradua et al., (2013) conducted an analysis of the competition identical to this study and extrapolated the dimensions of the 10v10 situation to a reduced 5v5 situation. Regarding the results of this investigation it can be stated that is not possible to do a proportional extrapolation of one situation to another, because each one of the game situations have a different playing areas. Based on the IPA of the 10v10 situation (84 m²) (Fradua et al., 2013), the area for a 7v7 situation should have, considering the number of players, an IPA of 59 m², and the 4v4 situation an IPA of 33.5 m². However, in competition there is a higher IPA in both situations (7v7=66 m² and 4v4=42 m²).

The results from this study showed that each game situation has its own characteristics, and they should be considered in relation to the zone of the pitch where the action occurs. This is a determining aspect for the tactical aims that the teams want to develop, and affect the configuration of playing areas that appear during competition.

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