

How Reaching the Pitch's Final Third is Related to Scoring Opportunities in Soccer?

Cómo la invasión del último tercio del campo se relaciona con las oportunidades de marcar en el fútbol?

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Abstract. This study aimed to identify the association between the criteria related to the final third entries (how, where, and spatial pattern of interaction between teams) and the success of offensive unities in elite soccer. We analyzed 3327 final third entries from 30 matches of the 2019 Copa do Brasil (Brazilian cup, from the round of 16 to the final). To analyze the associations between criteria and the attacking outcome, we used an association chi-square test (contingency tables) with the significance level set in $p < 0.05$. Results showed that the criteria «central corridor» ($z=5.5$), «ball recovery» ($z=6.8$), «midline vs. offensive line» ($z=2.9$), «offensive line vs. backline» ($z=2.6$), and «offensive line vs. empty zone» ($z=4.0$) were positively associated with successful offensive unities. We suggest that professional teams should try to achieve the final third through the central corridor, with offensive compactness, and forward passes to overcome the defensive lines. Defensively, teams should protect the central corridor, direct the opponent to the sides of the pitch, and closely defend the ball carrier.

Keywords: Soccer, match analysis, observational methodology, offensive organization.

Resumen. El propósito del estudio fue identificar la asociación entre los criterios de entrada en el último tercio (como, donde y configuración espacial de interacción) y el éxito de las unidades ofensivas en el fútbol de elite. Fueron analizados 3327 entradas en el último tercio de 30 partidos de Copa do Brasil de 2019 (Copa del Brasil, octavas de finales a finales). Para analizar las asociaciones entre los criterios y los resultados de los ataques, se utilizó la prueba de asociación de chi-cuadrado (tablas de contingencia) con $p < 0.05$. Los resultados mostraron que los criterios pasillo central ($z=5.5$), recuperación de balón ($z=6.8$), línea media vs. línea adelantada ($z=2.9$), línea adelantada vs. línea retrasada ($z=2.6$), y línea adelantada vs. portero ($z=4.0$) se asociaron positivamente con el éxito de las unidades ofensivas. Luego, se sugiere que los equipos profesionales utilicen el pasillo central, con compactación ofensiva y usando pases que superen las líneas defensivas. Defensivamente, los equipos deben proteger el pasillo central, dirigir al oponente a los lados del campo, y presionar constantemente el portador de balón

Palabras clave: Fútbol, análisis del juego, metodología de observación, organización ofensiva.

Introduction

Match analysis in soccer provides teams with information to achieve a higher performance level (Muhamad et al., 2013) by identifying effective behavioral patterns to score goals (Garganta, 2001; González-Rodenas et al., 2020). Match analysis might include individual (Lapresa et al., 2020) or collective (Bondia et al., 2017) information playing an essential role in teams' tactical and strategical modeling (Alves et al., 2019) and training activities design (Borrie et al., 2002), and, hence, represents a determining factor in the success of teams (Lago et al., 2010).

Many studies have characterized teams' performance

based on their scoring opportunities pattern (González-Rodenas et al., 2017). Previous studies suggest that goals are mainly scored from shots on the final third of the pitch (Wright et al., 2011), and increasing the control of the final third is associated with higher winning probability (Rein et al., 2017). Therefore, the importance of the pitch's last third to score a goal is widely accepted in the literature. However, the strategies used to control of this part of the pitch (e.g., how and where the attacks have been started) have not been related to the attacking outcome (obtaining or not a shooting opportunity). By understanding the strategies adopted by the teams to achieve and control the final third of the pitch and its relationship with the offensive outcomes, we expect to provide coaches and match analysts with valuable information for planning teams' tactics and strategies for the upcoming matches and designing training activities to develop individual

and collective tactics that are better associated with successful attacking unities.

Previous studies showed how teams could get ball possession in inner offensive zones of the pitch (Lago-Ballesteros et al., 2012; Vivés et al., 2018) and identified factors associated with shooting effectiveness (González-Rodenas et al., 2020). However, to the best of our knowledge, the efficiency of final third entries aiming to create goal-scoring opportunities has not been investigated. Therefore, this study aimed to identify which final third entries patterns are associated with successful attacking unities considering three independent criteria: ‘how’ (low pass, high pass, dribbling, set pieces, or ball recovery), ‘where’ (right, central, or left pitch corridors), and the spatial pattern of interaction between teams during the entry (ball in the empty zone vs. offensive line, backline vs. offensive line, backline vs. midline, backline vs. exterior zone, midline vs. offensive line, midline vs. midline, midline vs. backline, offensive line vs. midline, offensive line vs. backline, exterior zone vs. backline, offensive line vs. empty zone). The dependent criterion was the attacking outcome (successful or unsuccessful). We hypothesized that the three independent criteria would be positively associated with the attacking outcomes. Also, we expect that the final third entries by low passes, dribbling, and ball recovery (better ball control) would positively associate with entries in the central corridor (corridor closest to goal) when the attacking team was to face only one or none defensive line (vulnerable defensive organization).

Methodology

Sample

This study followed the observational methodology guidelines. According to the taxonomy of this area, the study design is classified as follow-up, nomothetic, and multidimensional (Blanco Villaseñor et al., 2003). The sample comprised 3327 final third entries performed by Brazilian teams in 30 matches of the 2019 Copa do Brasil (Brazilian cup): round of 16 (16 matches), quarterfinals (8 matches), semifinals (4 matches), and finals (2 matches). This competition is played in a knockout system, with home and away matches, and is the second most important competition played by professional teams in Brazil. The videos of the matches were obtained from broadcast recording; we excluded from analyses the final third entries in which the video did not allow the identification of the variables (e.g.,

when replays cut part of the offensive sequence). We analyzed only the matches played from the round of 16 because teams pre-ranked by international competitions (such as the Copa Libertadores da América) start participating in the competition in this phase. This choice allowed us to include only the matches played by the best teams in the country, excluding data from semi-professional or sub-elite teams.

Procedures

The final third entries of the 30 matches were split from the video footage using a dashboard in the software LongoMatch (Version 1.3.7 for Windows, Fluendo, Barcelona, Spain) (figure 1). The split scenes were analyzed using an observational instrument based on previous instruments available in the literature (Barreira, Garganta, Castellano & Anguera, 2013; Costa, Garganta, Greco, Mesquita & Maia, 2011). The analyzed categories and criteria and their descriptions and codes are shown in table 1. Figure 3 shows the pitch corridors and thirds considered in the study.

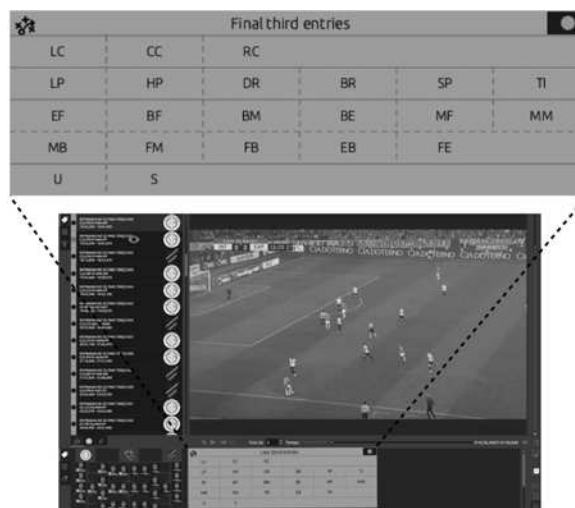


Figure 1. Dashboard developed in the LongoMatch Software.

Instruments

The category ‘spatial pattern of interaction between teams’ comes from the SoccerEye instrument (Barreira et al., 2013) (table 1, figure 2). The category ‘how’ and the possible attacking outcomes were based on the System of Tactical Assessment in Soccer (Costa et al., 2011). A team was considered to have ball possession when a player performed three consecutive touches on the ball or passed the ball to a teammate. Attacking unities that ended in a shot on goal were considered successful, while the loss of ball possession was considered unsuccessful. All the other possible outcomes (maintenance of ball possession – when a team takes

Table 1
Categories and criteria established for the observational analysis.

| Category | Criterion | Definition | Code |
|--|--|--|------|
| 'Where' (Pitch corridor) | Left-side corridor | When the final third entry occurs through the left side corridor. | LC |
| | Central corridor | When the final third entry occurs through the central corridor. | CC |
| | Right-side corridor | When the final third entry occurs through the right side corridor. | RC |
| 'How' (the way the entry started) | Low pass | When a player outside the final third passes to a teammate in the final third using a low pass. | LP |
| | High pass | When a player outside the final third passes to a teammate in the final third using a high pass. | HP |
| | Dribbling | When a player dribbles the ball (at least 3 consecutive touches) from the initial or middle third into the final third. | DR |
| | Ball recovery | When the ball is recovered by interception/steal, shot at goal, or ball in dispute (when neither team have ball control). | BR |
| | Set piece | When a player in the initial or middle third kicks the ball to a teammate in the final third or directly on goal from a set piece (foul, offside, goal kick, dropped ball) | SP |
| Spatial pattern of interaction between teams | Throw in | When a player throws in from the initial or middle third to a teammate in the final third. | TI |
| | Ball in the empty zone (goalkeeper) vs. offensive line | When, in the moment of the final third entry, the ball is between the goalkeeper of the attacking team and the offensive line of the defending team. | EF |
| | Back line vs. offensive line | When, in the moment of the final third entry, the ball is between the back line of the attacking team and the offensive line of the defending team. | BF |
| | Back line vs. midline | When, in the moment of the final third entry, the ball is between the back line of the attacking team and the midline of the defending team. | BM |
| | Back line vs. exterior zone | When, in the moment of the final third entry, the ball is between the back line of the attacking team and the exterior zone of the defending team. | BE |
| | Midline vs. offensive line | When, in the moment of the final third entry, the ball is between the midline of the attacking team and the offensive line of the defending team. | MF |
| | Midline vs. midline | When, in the moment of the final third entry, the ball is between the midline of the attacking team and the midline of the defending team. | MM |
| | Midline vs. back line | When, in the moment of the final third entry, the ball is between the midline of the attacking team and the back line of the defending team. | MB |
| | Offensive line vs. midline | When, in the moment of the final third entry, the ball is between the offensive line of the attacking team and the midline of the defending team. | FM |
| | Offensive line vs. back line | When, in the moment of the final third entry, the ball is between the offensive line of the attacking team and the back line of the defending team. | FB |
| | Exterior zone vs. back line | When, in the moment of the final third entry, the ball is between the exterior zone of the offensive line of the attacking team and the back line of the defending team. | EB |
| Offensive line vs. empty zone (goalkeeper) | When, in the moment of the final third entry, the ball is between the offensive line of the attacking team and the goalkeeper of the defending team. | FE | |
| Outcome | Unsuccessful | When the opponent recovers the ball or turn it into a dispute (e.g. interception, goalkeeper rebound). | U |
| | Successful | When the team shoots on goal (goal, goalkeeper's save or goalpost). | S |

the ball outside the final third, for example -, fragmented team – when the offensive team obtains a throw-in or a corner kick, for example -, fragmented opponent - when the defensive team obtains a throw-in or a goal kick, for example) were not analyzed because they could not be fully classified as successful or unsuccessful offensive sequences. Therefore, we included 1480 scenes in the final analysis. All the categories and criteria are detailed in Table 1. The pitch corridors are represented in figure 3.

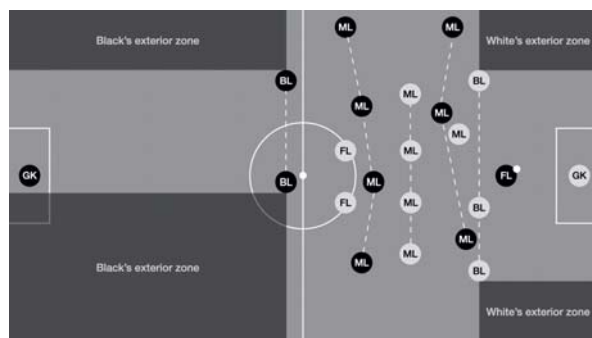


Figure 2. Illustration of spatial pattern of interaction between teams.
Notes. GK: goalkeeper; BL: back line; MF: midline; FM: offensive line.

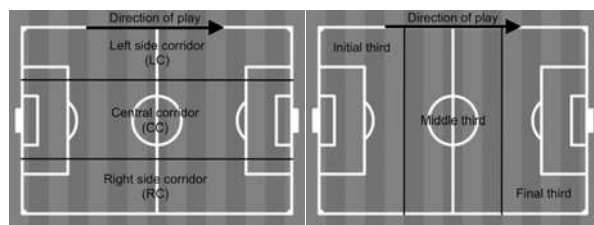


Figure 3. Pitch corridors and thirds.

To identify the depth of the final third, we used the strips created by the lawnmower. In most stadiums, there are 20 strips, so we assumed that the final third corresponds to 6 strips.

Data reliability

Twenty-one days after the first analysis, the three observers reanalyzed 376 attacking unities, corresponding to 11.3% of the total sample. The within and between-observer reliability were checked using the Kappa of Cohen coefficient. The reliability results are shown in Table 2.

Table 2
Intra and interobserver reliability (Kappa of Cohen coefficients)

| Category | Interobserver | Intraobserver |
|--|---------------|---------------|
| Where | 0.844 | 0.950 |
| How | 0.910 | 0.972 |
| Spatial pattern of interaction between teams | 0.800 | 0.825 |
| Outcome | 0.875 | 0.945 |

Statistical Analysis

To analyze the association between the criteria (how, where, and spatial pattern of interaction between teams) and the outcomes, we used an association chi-square test (contingency tables) with the level of significance set at $p < 0.05$. The Monte Carlo correction was used for frequencies lower than five. Adjusted residuals higher than 1.96 indicate positive associations between the variables (the increase in the frequency of one variable is associated with the increase in the frequency of the other one), and values lower than -1.96 indicate a negative association between the variables (the increase in the frequency of one variable is associated to the decrease in the frequency of the other one). All procedures were carried out using the statistical package SPSS (SPSS Version 19.0 for Windows, SPSS Inc.,

Results

We observed a positive and significant association

between the categories 'where' ($x^2=30.758$; $p<0.001$), 'how' ($x^2=48.274$; $p<0.001$), and 'spatial pattern of interaction between teams' ($x^2=36.097$; $p<0.001$) with the offensive outcomes. As observed in figure 4 and table 3, final third entries from the central corridor were positively associated with successful shots on goal ($z=5.5$). On the contrary, entries from the right-side ($z=2.1$) and left corridors ($z=2.8$) were positively associated with unsuccessful unities.

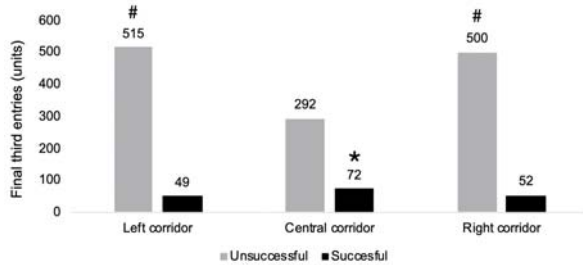


Figure 4. Successful and unsuccessful final third entries according to criteria of the category 'where'.

Notes.

Positive association between the criterion and the unsuccessful outcome.

* Positive association between the criterion and the successful outcome.

Concerning the category 'how' (figure 5 and table 3), we observed a positive association between recovering the ball ($z=6.8$) and successful outcomes. The low pass ($z=2.8$) and high pass ($z=2.1$) were positively associated with unsuccessful outcomes. Entries by dribbling ($z=|0.6|$), set pieces ($z=|0.0|$), and throw-ins ($z=|0.3|$) were not significantly associated with the outcomes.

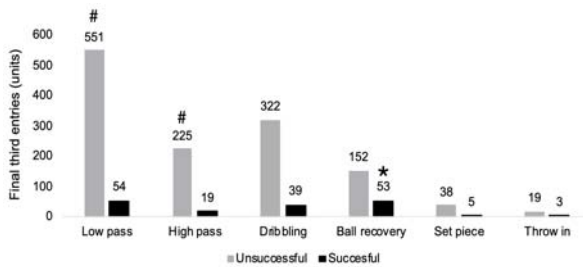


Figure 5. Successful and unsuccessful entries in the final third according to criteria related to the category 'how'.

Notes.

Positive association between the criterion and the unsuccessful outcome.

* Positive association between the criterion and the successful outcome.

Lastly, the 'spatial patterns of interaction between teams' «midline vs. offensive line» ($z=2.9$), «offensive line vs. backline» ($z=2.6$), and «offensive line vs. empty zone» ($z=4.0$) were positively associated with successful outcomes. The spatial pattern of interaction between teams characterized by offensive line vs. midline ($z=2.0$) was positively associated with unsuccessful outcomes. Finally, the «backline vs. midline» ($z=|0.4|$), «midline vs. midline» ($z=|1.5|$), «midline vs. backline» ($z=|1.1|$), and «exterior zone vs. backline» ($z=|0.4|$) were not significantly associated with the outcomes.

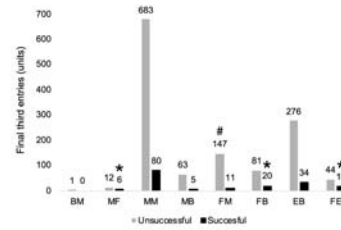


Figure 6. Successful and unsuccessful final third entries according to the criteria related to the category 'spatial pattern interaction between teams'.

Notes. BM: back line vs. midline; MF: midline vs. offensive line; MM: midline vs. midline; MB: midline vs. back line; FM: offensive line vs. midline; FB: offensive line vs. back line; EB: exterior zone vs. back line; FE: offensive line vs. empty zone.

Positive association between the criterion and the unsuccessful outcome.

Table 3

Associations between the investigated variables

| Category | Criterion | Frequency | | | | Adjusted residual | | |
|-------------|-----------|-----------|----|-------|------|-------------------|------|------|
| | | U | S | Total | m/m | Percent | U | S |
| Where | LC# | 515 | 49 | 564 | 18,8 | 38,1% | 2,8 | -2,8 |
| | CC* | 292 | 72 | 364 | 12,1 | 24,6% | -5,5 | 5,5 |
| | RC# | 500 | 52 | 552 | 18,4 | 37,3% | 2,1 | -2,1 |
| | Total | | | 1480 | 49,3 | 100,0% | | |
| How | LP# | 551 | 54 | 605 | 20,2 | 40,9% | 2,8 | -2,7 |
| | HP# | 225 | 19 | 244 | 8,1 | 16,5% | 2,1 | -2,1 |
| | DR | 322 | 39 | 361 | 12,0 | 24,4% | 0,6 | -0,6 |
| | BR* | 152 | 53 | 205 | 6,8 | 13,9% | -6,8 | 6,8 |
| | SP | 38 | 5 | 43 | 1,4 | 2,9% | 0,0 | 0,0 |
| | TI | 19 | 3 | 22 | 0,7 | 1,5% | -0,3 | 0,3 |
| | Total | | | 1480 | 49,3 | 100,0% | | |
| Interaction | BM | 1 | 0 | 1 | 0,0 | 0,1% | 0,4 | -0,4 |
| | MF* | 12 | 6 | 18 | 0,6 | 1,2% | -2,9 | 2,9 |
| | MM | 683 | 80 | 763 | 25,4 | 51,6% | 1,5 | -1,5 |
| | MB | 63 | 5 | 68 | 2,3 | 4,6% | 1,1 | -1,1 |
| | FM# | 147 | 11 | 158 | 5,3 | 10,7% | 2,0 | -2,0 |
| | FB* | 81 | 20 | 101 | 3,4 | 6,8% | -2,6 | 2,6 |
| | EB | 276 | 34 | 310 | 10,3 | 20,9% | 0,4 | -0,4 |
| | FE* | 44 | 17 | 61 | 2,0 | 4,1% | -4,0 | 4,0 |
| | Total | | | 1480 | 49,3 | 100,0% | | |
| Outcome | U | | | 1307 | 43,6 | 88,3% | | |
| | S | | | 173 | 5,8 | 11,7% | | |
| | Total | | | 1480 | 49,3 | 100,0% | | |

Notes. m/m: Mean per match; U: unsuccessful; S: successful; LC: left corridor; CC: central corridor; RC: right corridor; LP: low pass; HP: high pass; DR: dribbling; BR: ball recovery; SP: set piece; TI: throw in; BM: back line vs. mid line; MF: mid line vs. offensive line; MM: mid line vs. mid line; MB: mid line vs. back line; FM: offensive line vs. mid line; FB: offensive line vs. back line; EB: exterior zone vs. back line; FE: offensive line vs. empty zone;

Positive association between the criterion and the outcome Unsuccessful.

* Positive association between the criterion and the outcome Successful.

Discussion

Identifying successful behavioral patterns in soccer allows coaches and match analysts to improve teams' tactical-strategical plans and increase the chances of winning. For this reason, this study aimed to analyze the patterns of final third entries associated with successful offensive sequences in elite soccer. To the best of our knowledge, this is the first study to provide such data.

This study found that entries in the final third from the central corridor are positively associated with successful offensive unities. In contrast, entries from the lateral corridors are positively associated with unsuccessful outcomes. These results are in line with our hypothesis and with previous studies that showed that most of the goals occur from shots made in the central corridor (Barreira et al., 2014) and that this is an important area in offensive sequences that result in goals (Clemente et al., 2016). One reason for this result is that the central corridor allows players to shoot from

a better angle and shorter distance from the opposing goal (Pollard et al., 2004). Besides, when the ball is kept in the central corridor, players in the offense can circulate the ball towards both sides, providing more tactical options than when the ball starts in one of the lateral corridors (in this case, the player's options are limited by the sidelines). Hence, offensive unities developed using the central corridor might cause a higher instability in the defense since they will need to cover larger areas and deal with more tactical options available for the offensive team

The criterion «ball recovery» was positively associated with the successful outcome, which aligns with the literature and confirms our hypothesis. Recovering the ball in areas closer to the opponent's goal results in more goals and goal opportunities than further regions (Hughes & Lovell, 2019). The closer from the opposing goal the ball is recovered, the shorter is the distance to progress with the ball and create a scoring opportunity. It may also favor the creation of numerical imbalances and increase the distance between the player with the ball and his direct opponent (Harris & Reilly, 1987). Tenga, Holme, Ronglan & Bahr (2010) confirmed that facing unbalanced defensive systems is advantageous to the attacking team, confirming our rationale.

We also found that the criteria MF, FE, and FB were positively associated with successful unities, confirming our hypothesis regarding FE and FB. FE and FB are contexts of interaction that favor the offensive team (Machado, Barreira & Garganta, 2013) because they constitute situations in which the most advanced players on the pitch possess the ball against only one (or none) defensive line before the goal. The context MF suggests that the opposing team is positioned near the penalty area (deep block) and the ball is near the opposing goal; hence, the offense has a clear chance to shoot on goal (Pollard et al., 2004). In addition, the achievement of the final third by the midfielders suggests that the team in the offense has a larger number of passing options since all the players from the offensive line are ahead of the ball. Moreover, the variable FM was positively associated with unsuccessful offensive unities. This context of interaction suggests that when the final third is achieved by the most advanced offensive players, they still have another defensive line to overcome and there are a few teammates closer to the opponent's goal. This may cause a higher difficulty to achieve successful outcomes when the team achieves the final third in a FM context of interaction.

Some practical applications from the present results regard the definition of teams' game strategies and training activities by coaches and match analysts in the Brazilian context. In general, we recommend teams develop strategies focused on reaching the final third by the central corridor. This strategy may also be improved by increased compactness, which might help the team during the defensive transition and recover the ball as fast and deep as possible (preferable in the offensive midfield). Progressing with the ball to reaching the final third can also be achieved using ball circulation between the lateral corridors, creating instability in defense and allowing more efficient use of the central corridor. The positive associations between FE and FB with successful outcomes support the importance of depth mobility, mainly regarding the most defensive lines of the opposing team and prioritizing forward passes to the most advanced players in the pitch (center forwards, for example). In terms of defense, we recommend teams constantly protect the central corridor and direct the opposing team to the sides of the pitch. Also, defending teams should defend the player with the ball closely, reduces his/her possibilities to pass forward. Finally, for offensive transitions, teams should quickly take the ball out of the center of pressure of the opposing team, avoiding losing the ball in the first third and an advantageous situation for the opponent to score.

This study provides innovative results on the association between final third entries and the scoring opportunities in top-level soccer. However, as a limitation of our study, we highlight that our data did not consider the situational context (e.g., match status, match venue, and aggregate score) and the defensive/offensive strategies of the teams. Therefore some behavioral patterns might have occurred due to teams' predefined strategies. Finally, we only analyzed the 16 best clubs in the 2019 Copa do Brasil (Brazilian Cup), limiting the application of the results to other playing levels (e.g., sub-elite or youth academies) and round-robin competitions. Finally, we recommend future studies with larger samples to adopt regression analysis to adequately establish predictive models regarding the relationship between goal-scoring opportunities and entries in the pitch's final third.

Conclusions

We conclude that the three criteria analyzed – how, where, and spatial pattern of interaction between teams

– are associated with the success of an offensive unity. Final third entries from the central corridor, set-pieces, throw-ins, ball recovery, and in which the spatial pattern of interaction between teams is characterized by midline vs. offensive line, offensive line vs. empty zone, or offensive line vs. backline have an increased chance of resulting in a shot on goal.

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References

- Alves, D. L., Osiecki, R., Palumbo, D. P., Moiano-Junior, J. V. M., Oneda, G., & Cruz, R. (2019). What variables can differentiate winning and losing teams in the group and final stages of the 2018 FIFA World Cup? *International Journal of Performance Analysis in Sport*, 19(2), 248–257. <https://doi.org/10.1080/24748668.2019.1593096>
- Barreira, D., Garganta, J., Castellano, J., & Anguera, M. T. (2013). SoccerEye: A Software Solution to Observe and Record Behaviours in Sport Settings. *The Open Sports Sciences Journal*, 6(1), 47–55. <https://doi.org/10.2174/1875399x01306010047>
- Barreira, D., Garganta, J., Castellano, J., Prudente, J., & Anguera, M. T. (2014). Evolución del ataque em el fútbol de élite entre 1982 y 2010: Aplicación del análisis secuencial de retardos. *Revista de Psicología Del Deporte*, 23(1), 139–146.
- Bondia, I. L., González-Rodenas, J., Moreno, F. C., Pérez-Turpin, J. A., & Malavés, R. A. (2017). Creating goal scoring opportunities in elite soccer: Tactical differences between Real Madrid CF and FC Barcelona. *Retos*, 32, 233–237. [https://doi.org/10.47197/retos.v0i32.56467](https://doi.org/https://doi.org/10.47197/retos.v0i32.56467)
- Borrie, A., Jonsson, G. K., & Magnusson, M. S. (2002). Temporal pattern analysis and its applicability in sport: An explanation and exemplar data. *Journal of Sports Sciences*, 20(10), 845–852. <https://doi.org/10.1080/026404102320675675>
- Clemente, F. M., Martins, F. M. L., & Mendes, R. S. (2016). Analysis of scored and conceded goals by a football team throughout a season: A network analysis. *Kinesiology*, 48(1), 103–114. <https://doi.org/10.26582/k.48.1.5>
- Costa, I. T., Garganta, J., Greco, P. J., Mesquita, I., & Maia, J. (2011). System of tactical assessment in Soccer (FUT-SAT): Development and preliminary validation. *Motricidade*, 7(1), 69–83. <https://doi.org/10.6063/motricidade.121>
- Garganta, J. (2001). A análise de performance nos jogos desportivos: revisão acerca da análise de jogo. *Revista Portuguesa de Ciências Do Desporto*, 1(1), 57–64. <https://doi.org/10.5628/rpcd.01.01.57>
- González-Rodenas, J., Lopez-Bondia, I., Calabuig, F., Pérez-Turpin, J. A., & Aranda, R. (2017). Creation of goal scoring opportunities by means of different types of offensive actions in US major league soccer. *Human Movement*, 18(5), 106–116. <https://doi.org/10.5114/hm.2017.73616>
- González-Rodenas, J., Mitrotasios, M., Aranda, R., & Armatas, V. (2020). Combined effects of tactical, technical and contextual factors on shooting effectiveness in European professional soccer. *International Journal of Performance Analysis in Sport*, 20(2), 280–293. <https://doi.org/10.1080/24748668.2020.1743163>
- González-Rodenas, J. G., Malavés, R. A., Desantes, A. T., Ramírez, E. S., Hervás, J. C., & Malavés, R. A. (2020). Past, present and future of goal scoring analysis in professional soccer. *Retos*, 37, 774–785. <https://doi.org/https://doi.org/10.47197/retos.v37i37.69837>
- Harris, S., & Reilly, T. (1987). Space, teamwork and attacking success in soccer. *Science and Football*, 2, 322–328.
- Hughes, M., & Lovell, T. (2019). Transition to attack in elite soccer. *Journal of Human Sport and Exercise*, 14(1), 236–253. <https://doi.org/10.14198/jhse.2019.141.20>
- Lago, C., Martínez, L., Lago, E., Acero, R., & Vargas, F. (2010). The Influence of Match Location, the Quality of Opposition and Match Status on Possession in Professional Football. *Apunts. Educación Física y Deportes*, 4(102), 78–86.
- Lago-Ballesteros, J., Lago-Peñas, C., & Rey, E. (2012). The effect of playing tactics and situational variables on achieving score-box possessions in a professional soccer team. *Journal of Sports Sciences*, 30(14), 1455–1461. <https://doi.org/10.1080/02640414.2012.712715>
- Lapresa, D., Blanco, F., Amatria, M., Arana, J., & Anguera, M. T. (2020). Observational Analysis of the Execution of the «Control» Core Technical/Tactical Concept by Sergio Busquets. *Apunts Educación Física y Deportes*, 2(140), 52–62. [https://doi.org/10.5672/apunts.2014-0983.es.\(2020/2\).140.08](https://doi.org/10.5672/apunts.2014-0983.es.(2020/2).140.08)
- Machado, J. C., Barreira, D., & Garganta, J. (2013). Eficácia ofensiva e variabilidade de padrões de jogo em futebol. *Revista Brasileira de Educação Física e Esporte*, 27(4), 667–677.
- Muhamad, S., Norasrudin, S., & Rahmat, A. (2013). Differences in Goal Scoring and Passing Sequences between Winning and Losing Team in UEFA-EURO Championship 12. *International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering*, 7(2), 332–337. <https://doi.org/10.5281/zenodo.1083761>
- Pollard, R., Ensum, J., & Taylor, S. (2004). Estimating the probability of a shot resulting in a goal: The effects of distance, angle and space. *International Journal of Soccer and Science*, 2(1), 50–66.
- Rein, R., Raabe, D., & Memmert, D. (2017). «Which pass is better?» Novel approaches to assess passing effectiveness in elite soccer. *Human Movement Science*, 55, 172–181. <https://doi.org/10.1016/j.humov.2017.07.010>
- Tenga, A., Holme, I., Ronglan, L. T., & Bahr, R. (2010). Effect of playing tactics on goal scoring in norwegian professional soccer. *Journal of Sports Sciences*, 28(3), 237–244. <https://doi.org/10.1080/02640410903502774>
- Villaseñor, Á. B., López, J. L. L., & Arguilaga, M. T. A. (2003). Data analysis techniques in observational designs applied to the environment-behaviour relation. *Medio Ambiente y Comportamiento Humano*, 4(2), 111–126.
- Vivés, M., Martín, J., Hileño, R., Torrents, C., & Ric, Á. (2018). Passing dynamics in football according to ball recovery. *Apunts Educación Física y Deportes*, 134, 124–133. [https://doi.org/10.5672/apunts.2014-0983.es.\(2018/4\).134.09](https://doi.org/10.5672/apunts.2014-0983.es.(2018/4).134.09)
- Wright, C., Atkins, S., Polman, R., Jones, B., & Sargeson, L. (2011). Factors associated with goals and goal scoring opportunities in professional soccer. *International Journal of Performance Analysis in Sport*, 11(3), 439–449. <https://doi.org/10.1080/24748668.2011.11868563>