

## Performance indicators to be explored in order to win Premier League matches

Indicadores de rendimento a serem explorados para vencer partidas da Premier League

Indicadores de rendimiento a explotar para ganar partidos de la Premier League

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### Abstract

Football is a dynamic collective sport that involves the actions of players on the field, in addition to the availability and application of player data. Being a sport extensively investigated in terms of performance analysis, there is still a need for more predictive analyzes to better understand the indicators of success. Due to these aspects, this research aimed to verify the influence of the market value of football clubs, as well as the influence of the venue and the tactical/technical aspects - shots on target, corners, crosses, ball possession and passes -, to win Premier League matches. To carry out this research, data from all 380 matches of the PL 2015/2016 season were used. The Transfermarkt website was used to collect the market value of the teams and the Daily Mail website to collect the matches data. Data analysis was performed using the Weka software. The results showed that the market value and the venue, separately, were not relevant to the victories, but when associated to tactical/technical indicators, both contributed with the victories of the teams. Concept A teams, with higher market values, achieved more victories than the concept C teams, with lower market values, in the home games when the aforementioned associations were analyzed. The results of the performed analyzes show that direct and indirect game actions are relevant for teams to win matches played at home, especially for the ones with higher market value.

**Keywords:** Football; Performance indicators; Market value; Venue; Winning football matches.

### Resumo

O futebol é um esporte coletivo dinâmico que envolve as ações dos jogadores em campo, além da disponibilidade e da aplicação de dados dos jogadores. Sendo um esporte extensivamente investigado em termos de análise de rendimento, ainda há uma necessidade de mais análises preditivas para um melhor entendimento dos indicadores de sucesso. Devido a estes aspectos, esta pesquisa objetivou verificar a influência do valor de mercado dos clubes de futebol, assim como a influência do mando de campo e de aspectos técnico-táticos – finalizações no gol, escanteios, cruzamentos, posse de bola e passes – para vencer partidas na Premier League. Para realizar esta pesquisa, dados das 380 partidas da PL 2015/2016 foram utilizados. O site do Transfermarkt foi utilizado para coletar o valor de mercado das equipes e o site do Daily Mail para coletar dados das partidas. A análise de dados foi realizada utilizando o software Weka. Os resultados apresentaram que valor de mercado e mando de campo, separados, não foram relevantes para a conquista de vitórias, mas ao estarem associados com indicadores técnico-táticos, ambos contribuíram para as vitórias das equipes. Equipes de conceito A, com maior valor de mercado, conquistaram mais vitórias que as equipes de conceito C, com menor valor de mercado, nas partidas em casa. Os resultados das análises mostram que ações de jogo direto e indireto são relevantes para que equipes vençam partidas em casa, especialmente para as equipes de maior valor de mercado.

**Palavras-chave:** Futebol; Indicadores de rendimento; Valor de mercado; Mando de campo; Vencer partidas de futebol.

### Resumen

Fútbol es un dinámico deporte de equipo que involucra las acciones de los jugadores en el campo, además de la disponibilidad y de la aplicación de datos. Siendo un deporte ampliamente investigado en términos de análisis de rendimiento, todavía se necesitan más análisis predictivos para una mejor comprensión de los indicadores de éxito. Por estos aspectos, esta investigación tuvo como objetivo verificar la influencia del valor de mercado de los clubes de

fútbol, así como la influencia del local y de los aspectos técnico-tácticos – tiros a puerta, saques de esquina, centros, posesión y pases -, para ganar partidos en la Premier League. Para hacer esta investigación se utilizaron datos de los 380 partidos de la PL 2015/2016. El sitio web del Transfermarkt se utilizó para recopilar el valor de mercado de los equipos y el sitio web Daily Mail se utilizó para recopilar datos de los partidos. El análisis de datos se realizó utilizando el software Weka. Los resultados muestran que el valor de mercado y el local, separados, no fueron relevantes para obtener victorias, pero cuando se asociaron con indicadores técnico-tácticos, ambos contribuyeron para las victorias de los equipos. Los equipos de concepto A, de valor de mercado más alto, obtuvieron más victorias que los equipos de concepto C, de menor valor de mercado, en los partidos en casa que mostraron estas asociaciones. Los resultados muestran que las acciones de juego directo y indirecto son relevantes para que los equipos ganen partidos en casa, especialmente para los equipos con valor de mercado más alto.

**Palabras clave:** Fútbol; Indicadores de rendimiento; Valor de mercado; Local; Ganar partidos de fútbol.

## 1. Introduction

Football is a complex and dynamic team sport (Garganta, 2009; Liu et al., 2015), which the performance of the teams blends interactions between psychological, physical, tactical/technical, match location (play at home or at the opponent's home) and financial aspects (Carling et al., 2008; Drust et al., 2007; Lima et al., 2017; Lima et al., 2021; Liu et al., 2015; Rocha-Lima et al., 2021a; Rocha-Lima et al., 2021b; Tertuliano et al., 2018; Yi et al., 2019).

Assuming the financial aspects, the literature has investigated the influence of the cast (staff training) on clubs results (Lima, Oliveira et al., 2018; Mijatović et al., 2015; Pavlovic et al., 2013; Pavlovic et al., 2014; Tertuliano et al., 2018, 2020). For this, the literature uses the athletes' market value, which ends up determining the clubs' market value as well, as the clubs' market value is equivalent to the sum of their squad's market value (Lima et al., 2018). Considering the market analysis, there are numerous resources that can assist in gathering information, such as Football Manager (FM) and Transfermarkt (TM). These resources, which are electronic, are considered effective and reliable for gathering information on players' market values (Lima et al., 2017; Lima et al., 2021; Lima et al., 2018; Pavlovic et al., 2014; Sæbø & Hvattum, 2015).

Considering the financial information, the literature is based on the following possibilities: (1) the clubs with the most expensive squads - the most valued players in the market - are the most valued clubs; (2) the most valued clubs are the clubs with the best competitive results. These possibilities are due to the fact that the clubs that have the most expensive squads are the clubs that have the best players, which contributes to the best competitive results (Kuper & Szymanski, 2014; Tertuliano et al., 2020).

However, this relationship between market value and competitive results is refuted by some studies (Mijatović et al., 2015; Pavlovic et al., 2013, 2014), showing the need of more studies on the subject. A possible explanation for this need of more studies is the fact that other match variables, in addition to the cast value, influence game results, such as passes (Anderson & Sally, 2013; Bradley et al., 2014; Collet, 2013), goals scored (Yi et al., 2019), venue (Bradley et al., 2014; Lago-Peñas & Dellal, 2010), scoreboard (Bradley et al., 2014; Lago-Peñas & Dellal, 2010), among others (Rocha-Lima et al., 2021a; 2021b), showing that other variables can also be relevant to the success of teams in competitions.

Considering the tactical/technical aspects, numerous studies were conducted with the aim of understanding individual (Bradley et al., 2016) and team performance (Castellano et al., 2012; Lago-Peñas et al., 2010; Yang & Chen, 2018), including in specific alloys (Lima, Oliveira, et al., 2018; Liu et al., 2015; Liu et al., 2016; Rocha-Lima et al., 2021a; 2021b; Schauburger et al., 2018; Tertuliano et al., 2020) analyzing the relationship of these aspects with the match results.

As another influence on results, we can also mention the venue (Bradley et al., 2014; Lago-Peñas & Dellal, 2010). The literature mentions that teams tend to win more games at home than at the opponent's home (Lago-Peñas & Lago-Ballesteros, 2011; Legaz-Arrese et al., 2013; Mackenzie & Cushion, 2012; Rocha-Lima et al., 2021a; Sarmiento et al., 2014), as they feel more confident playing at home, favoring the development of tactical/technical aspects, such as defending more consistently, for example (Almeida et al., 2014; Lago-Peñas & Lago-Ballesteros, 2011).

However, the mentioned studies treated the tactical/technical aspects alone or associated to the venue, without considering the market value of the clubs, mentioned above as a possible relevant variable for competitive performance. Therefore, the guiding question of this study was: Is there a relationship between the clubs' market value, the place of play and the tactical/technical aspects in the competitive performance of soccer teams?

To answer this question, we chose to follow the Premier League football, one of the most important football leagues in the world. Thus, the aim of this study was to analyze the influence of the market value of football clubs, as well as the influence of venue and tactical/technical aspects - shots on goal, corners, crosses, ball possession and passes -, to win Premier League football matches.

## 2. Methodology

This research is characterized as quantitative and, therefore, there was strict control of the variables through precise measurements, with a focus on the objective analysis of a large database. The data were described and presented the characteristics of the relationships obtained between the variables investigated (Johnson & Wichern, 2007).

As we chose to analyze the Premier League (PL), data referring to the 2015/2016 season of the PL were collected. Thus, data from 380 matches in the PL were analyzed, which took place in 38 rounds, with the participation of 20 football clubs. In addition to this information, based on the objective of the study, data regarding the market value of all clubs that participated at the mentioned season were also collected. These values were collected on the Transfermarkt (TM) website (<https://www.transfermarkt.com/>).

The market value of clubs, in TM, is computed by adding the market value of the entire squad (Lima et al., 2017). The 20 clubs were divided into 4 groups, according to their market values. This division allowed a better analysis of the influence of market value on match results. In this sense, the groups were nominated in concept teams A, B, C or D. Concept A included teams with a market value of more than 300 million euros; teams whose market value was between €150 million and €299 million were included in the concept B; concept C was used for teams whose market value was between €100 million and €149 million; and concept D included teams with a market value of less than €100 million. Based on these ranges, the division of groups was: concept teams A and B concept teams with 5 teams each one; the C concept with 8 teams; concept D with 2 teams. The different number of teams per group is not a limitation of the study, as the information is presented in percentage terms, removing the “group size” effect.

To obtain the other desired data about the PL, access was made to the Daily Mail website (<https://www.dailymail.co.uk/sport/football/premier-league/matchzone.html>), specifically in the topic 'sport', to extract the indicators of the matches - wins, draws, losses, shots on goal, corners, crosses, ball possession and passes - to be analyzed. As a preliminary analysis, it can be mentioned that 157 matches were won by the home teams (41%), 107 were tied (28%) and 116 were won by the visiting teams (31%). Regarding the extracted match indicators, it was decided to use some data ‘classifiers’ in order to facilitate the analysis. These classifiers were created based on the literature (Hughes, 1990; Rocha-Lima et al., 2021a; 2021b). Thus, the match results classifier received 3 possible concepts: A, home team victory; B, tie; and C, victory for the visiting team.

The equivalent was used for the values of shots on goal, corners, crosses, ball possession and passes indicators, which also received 3 possible concepts: A, the home team presented higher value for the specific indicator than the visiting team; B, home and away teams with the same value for the indicator; and C, the visiting team had a higher value for the specific indicator.

After classifying all the data collected from the 380 PL matches, the next step consisted in analyzing these data in order to identify possible relationships between market value, tactical/technical variables (the extracted indicators) and the

teams' success in the matches of the PL. Thus, the dataset generated was analyzed using a data mining software called Weka (Weka, 2020), in particular, considering the association rule technique.

The Weka software was chosen because it is an instrument that allows the generation of association rules between the variables and the classifiers selected for the study. An association rule represents an implication hypothesis in the form 'A → B with probability P' (Besemann et al., 2004; Oliveira et al., 2004; Zheng et al., 2001), describing the occurrence of B, dependent on A, with probability P for this occurrence, with support and confidence as the most used measures (Weiss & Zhang, 2003), with the first measuring the frequency of the found relationships and the second the strength of the observed relationships.

Weka produced a large set of association rules that was analyzed in order to verify the contributions to the objectives of this research, characterizing the data exploration process, which prioritizes the validation of information, confronting them with existing commitments and possibly arriving at broad and effective generalizations (Weiss & Zhang, 2003). As all the information used in the study is available on specialized websites, there was no need to submit this research for approval by an ethics and research committee. Some studies were conducted with PL data using Weka and its association techniques described above (Rocha-Lima et al., 2021a; 2021b).

### 3. Results and Discussion

According to the analyses, assuming the 380 matches of the PL season 2015/2016, it can be observed that there were 273 matches in which some team won (home team or away team) and 107 matches that ended in a draw. As for victories, the teams that won the most part of the matches, regardless of whether the matches were at home or at the opponent's home, were from concept A teams (32.2% of the matches) (Table 1). The results also showed more victories for teams of concept C (25.6% of matches) when compared to teams of concept D (19.4%) and B (22.7%). In this case, the market value did not influence competitive performance. Even assuming the 88 games won by the concept A teams, the influence of the market value of these teams cannot be affirmed, as the number of victories, in percentage terms was close (32.2%) to the ones obtained by the teams of the other concepts. That is considering the market value, alone, it did not influence the sporting performance of the teams that competed in the PL season 2015/2016. This information is reinforced with the winning percentage of concept C teams (25.6% of matches), which was higher than the winning percentage of concept B clubs (22.7%).

**Table 1** - Matches won (total of 273) by teams from A to D concepts at PL 2015/2016 season.

Teams - Concepts	Victories	Winning Percentage
A	88	32.2%
B	62	22.7%
C	70	25.6%
D	53	19.4%

Source: Authors.

Assuming the influence of the venue (in all 380 matches), the data in Table 2 show that the home teams won more games than the visiting teams – 41.3% of the matches, that is, the venue might have influenced the number of victories. However, the values of draws (28.3%) and of victories by away teams (30.4%), when added (58.7% of matches), show that the venue alone was not decisive for the victories in the season, although they had a greater influence on the results of the matches, compared to the influence of the teams' market value.

**Table 2** - Match results based on venue in the PL 2015/2016 season (380 matches).

Match results	Victories	Winning Percentage
Home teams	157	41.3%
Draws	107	28.3%
Away teams	116	30.4%

Source: Authors.

Continuing the analysis, now associating the market value with the venue, the data in Table 3 show that the clubs that won the most of the matches at home were the ones of the concept teams A (57.9%) and B (52.6%), percentages that are at least 26.7% higher than the one obtained by other team concepts when they played at home, suggesting an interesting association between teams with higher market value and the venue that can benefit these concept teams.

**Table 3** - Victories according to home teams concepts (380 matches).

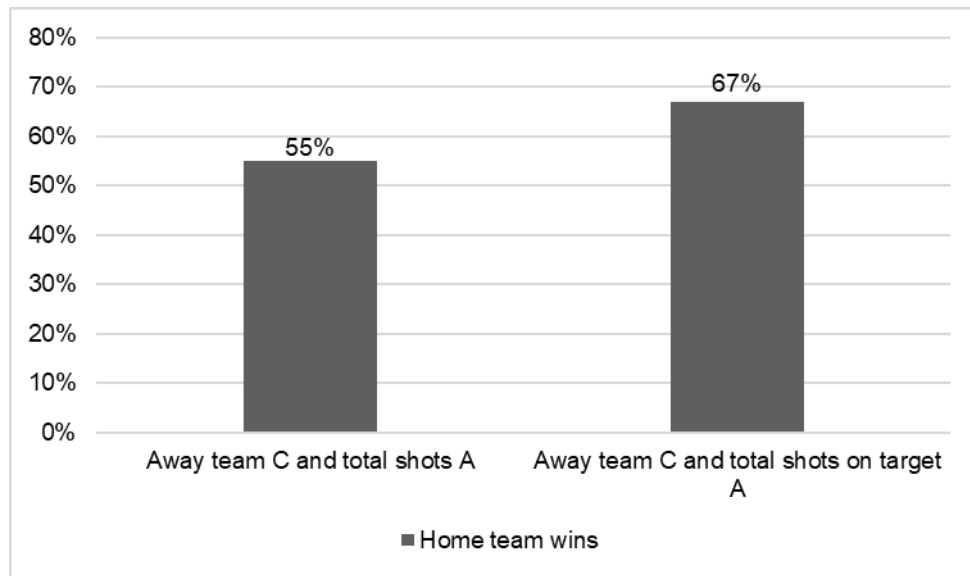
Teams - Concepts	Home matches	Victories at home	Winning Percentage
A	95	55	57.9%
B	76	40	52.6%
C	130	54	41.5%
D	79	32	40.5%

Source: Authors.

In order to verify the influence of the association between market value, venue and tactical/technical aspects - shots on goal, corners, crosses, ball possession and passes - on the results of the matches, the Weka software was used. Weka showed differences between the associations only for the concept teams A and C, that is, there was no influence of these factors, in association, when comparing concept A teams with concept teams B or D or comparing concept B teams with concept teams C or D and also for concept C teams with concept D teams.

Considering the differences between concept teams A and C, considering the total number of shots and shots on target, the information in Figure 1 shows that when concept A teams played at home and had more shots than concept C teams, they won 55% of 103 matches. Furthermore, when concept A teams, in home matches, recorded more shots on target than concept C teams, instead of total shots, the winning percentage increased to 67%, suggesting that the total of kicks and kicks on target, associated with the venue, are more beneficial for the concept A teams than to concept C teams.

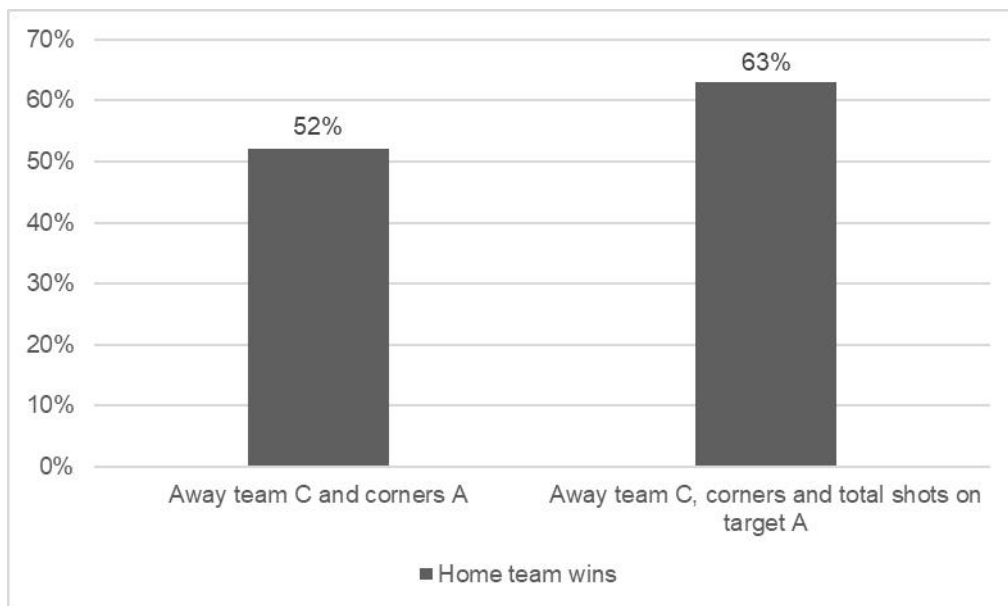
**Figure 1** - Influence of the association between venue, total shots and shots on goal in matches between concept teams A and C.



Source: Authors.

Next, Weka's analyzes also suggest that there was an influence of the association between venue and corners. The data in Figure 2 indicate that when the concept A teams, when they played at home with the concept C teams and had more corners than the concept C teams, won 52% of 90 matches. Furthermore, the number of victories rose to 63% of 60 matches when the concept A teams had more corners and more shots on goal than the concept C teams. Information presented by Weka suggests, in particular for concept A teams when they play at home against concept C teams, that having more corners and shooting more on goal represent a good combination to be explored in matches.

**Figure 2** - Influence of the association between venue, total corners and shots on goal in matches between concept teams A and C.

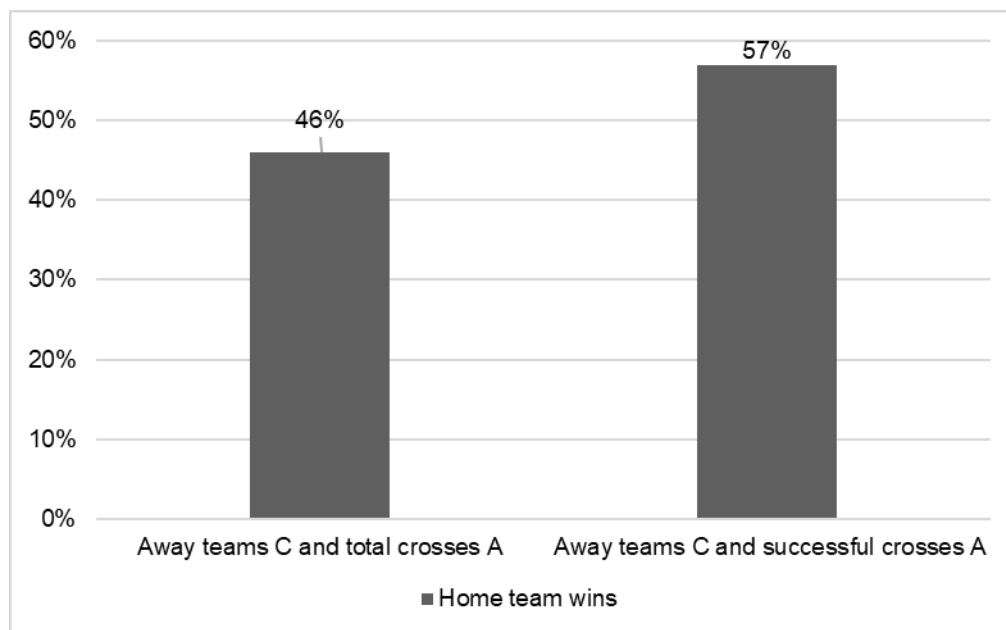


Source: Authors.

Considering the association between venue, total crosses and successful crosses, Weka's results show that concept A teams, when playing at home against concept C teams, won 46% of 83 matches when they computed more crosses than

concept C teams. The number of wins rose to 57% of 67 matches when concept A teams had more successful crosses than concept C teams, suggesting that being more precise in the crosses had more “impact” on concept A teams' victories when play at home against the concept C teams.

**Figure 3** - Influence of the association between venue, total crosses and successful crosses in matches between A and C concept teams.



Source: Authors.

Ultimately, the associations between venue, shots on target ball possession and total passes suggest that A concept teams, when playing at home against C concept teams, won 53% of the matches when they computed, in association, more ball possession and total passes. These analyzes offer interesting contributions because, although Weka showed that the A concept teams won 53% of the matches against the C concept teams, these components - possession of the ball and passes, associated with the venue, were less relevant than shots on target for the A concept teams win the matches, compared to the other associations to venue, such as venue and passes.

A concept teams won 71% of matches when they had more ball possession time and more long passes, in addition to winning 68% of matches when they had less ball possession time and more shots on target. These results suggest, in fact, that ball possession time is not a good indicator of victory, but that other variables associated with venue are more relevant. This information is supported by the results of Figures 1 and 2, given that the total number of shots on target associated with the venue, as well as the total number of corners and the total number of shots on target associated with the venue influenced more than 63% of the victories of the A concept teams when they played against C concept teams, showing to be more interesting for coaches to explore in matches.

Since the objective of this study was to analyze the influence of the market value of soccer clubs, as well as the influence of the location and the tactical/technical aspects - kicks on goal, corners, crosses, possession of the ball and passes -, in winning matches considering the data from the PL 2015/2016 season, the results showed that, despite the A concept teams obtaining more victories than the other teams (32.2%), this factor alone was not decisive for the sports performance of these teams (Table 1), that is, the value of the teams' market alone did not influence the results of the PL 2015/2016 season.

These results corroborate the literature, suggesting that the market value of teams alone is not a determining factor for the outcome of a match (Mijatović et al., 2015; Pavlovic et al., 2013, 2014; Tertuliano et al., 2018), that is, other match variables, associated with market value, influence the results of the match, such as venue (Bradley et al., 2014; Lago-Peñas & Dellal, 2010), goals scored (Yi et al., 2019), passes (Anderson & Sally, 2013; Paul Simon Bradley et al., 2014; Collet, 2013), among others (Rocha-Lima et al., 2021a; 2021b), suggesting that the success of teams is the result of an association of variables and not the result of an isolated one.

Thus, analyzing the influence of the venue on the results of the matches, in isolation, Table 2 showed that the teams that played at home won 41.3% of the matches, that is, when we add the values of ties (28.3% of matches) and victories of visiting teams (30.4% of matches) we observe that home teams did not win 58.7% of matches. These data suggest that the home factor alone was not decisive for the victories in the season, reinforcing the information mentioned in the previous paragraph, that is, the results of the matches depend on the association of variables, such as market value and venue (Bradley et al., 2014; Lago-Peñas & Dellal, 2010; Mijatović et al., 2015; Pavlovic et al., 2013, 2014; Tertuliano et al., 2018).

Assuming the association between market value and venue, the results of Table 3 suggest that this association was relevant for the results of the matches, as the A and B concept teams, when playing at home, won 57.9% and 52.6% of matches, respectively, showing superiority of teams with higher market value when playing at home, which is corroborated by the literature (Bradley et al., 2014; Lago-Peñas & Dellal, 2010).

In addition, the literature mentions that the venue associated with other variables, such as tactical/technical aspects, are relevant to success in matches (Lago-Peñas & Lago-Ballesteros, 2011; Legaz-Arrese et al., 2013; Mackenzie & Cushion, 2012; Rocha-Lima et al., 2021a; Sarmiento et al., 2014). The literature cites that teams that play at home tend to develop, more efficiently, attack and defense actions, such as shots on target, crosses, ball possession and pass, as they feel more confident when playing at home (Almeida et al., 2014; Lago-Peñas & Lago-Ballesteros, 2011).

Therefore, the literature emphasizes that the match venue is a relevant factor for the development of tactical/technical aspects, that is, for the teams' defensive and offensive performance (Lago-Peñas & Lago-Ballesteros, 2011; Legaz-Arrese et al., 2013; Mackenzie & Cushion, 2012; Sarmiento et al., 2014). The best teams, when playing at home, tend to play more in the offensive zone with more ball possession, to defend more consistently and to improve the team's performance, also counting on the support of the fans, which can increase the response and defensive effectiveness of football players (Almeida et al., 2014; Lago-Peñas & Lago-Ballesteros, 2011; Moreira et al., 2016; Taylor et al., 2010).

Similar results were found in the present study, and more than that, when these factors were associated with the team's market value, we obtained relevant results, with A concept teams being superior to C concept teams when they played at home. Thus, the results presented in Figures 1 to 4, comparing teams of concept A and C, bring to the discussion two important aspects to be addressed: team quality (tactical/technical aspects, such as shots on target, corners, crosses, ball possession and total passes) and venue. Both aspects are already mentioned in the literature, showing significant effects not only on playing styles (Fernandez-Navarro et al., 2018) but also on ball possession time (Lago-Peñas & Dellal, 2010) and on the performance of soccer teams (Bilek & Ulas, 2019; Lago, 2009; Lepschy et al., 2020; Taylor et al., 2010; Taylor et al., 2008).

The results presented in Figure 1 shows that the A concept teams won 55% of the matches played at home against the C concept teams, when they had more shots than these teams, but that the performance rose to 67% when they had more shots on target, indicating that shots on target are relevant for winning matches at home, which is corroborated by the literature and classified as a direct match (Rocha-Lima et al., 2021a; 2021b).

In the case of corner kicks, Figure 2 shows that the A concept teams, when playing at home, won 52% of the games played with the C concept teams, but that the performance rose to 63% when the total of corners with total shots on target,



suggesting that the association between corners and shots on target is a performance indicator to be explored by teams in PL matches, and that having more corners seems to be beneficial for the positive result in matches.

This information is also cited in the literature, which already has authors who have connected corners with match status (De Baranda & Lopez-Riquelme, 2012), match results (Anderson & Sally, 2013; Rocha-Lima, 2018), in the league table (Gollan et al., 2018; Souza et al., 2019), defense strategies (Kubayi & Larkin, 2019; Pulling et al., 2013; Pulling & Newton, 2017), areas and how to deliver the ball into the area (Beare & Stone, 2019; Pulling, 2015; Schmicker, 2013; Strafford et al., 2019), in addition to goal predictions (Anderson & Sally, 2013; Pulling et al., 2013; Taylor et al., 2005), which also provide additional support for discussing the association between corners and shots on target.

In addition to the above, the literature argues that a third of the goals scored in the context of elite football are scored directly or indirectly in set pieces (Armatas et al., 2007; Yiannakos & Armatas, 2006), in addition, the number of shots on target and corner kicks are also seen as attack variables with greater connection to obtaining points during a football season (Souza et al., 2019), even if the authors consider that high-ranking teams showed control of offensive movements and balls established stops (Gollan et al., 2018).

Despite having a low number of goals scored in total corners (Anderson & Sally, 2013; Beare & Stone, 2019; De Baranda & Lopez-Riquelme, 2012; Page & Robins, 2012; Poon et al., 2012; Pulling, 2015; Pulling et al., 2013; Rocha-Lima et al., 2021a; Schmicker, 2013; Taylor et al., 2005), some authors also described more recommended regions within the offensive area to exploit to score more goals (Poon et al., 2012; Schmicker, 2013; Taylor et al., 2005), such as the area near the penalty spot, where 4 out of 9 goals from a survey were scored (Pulling, 2015), the central area, closer to the goal line (Beare & Stone, 2019) and also the first post (Kubayi & Larkin, 2019), with dynamic attack organizations also being mentioned as recommended actions (Strafford et al., 2019). It should be remembered that these areas are closer to the corner, which can make it easier to reach them through the corner and, consequently, after the corner, the shots on target. In this way, the authors not only inform about the chance of goals, but also contribute with suggestions on how to maximize them.

The results presented in Figure 3. indicate an interesting variable to be considered in order to win a large number of matches, which consists of having more crosses in open play with greater success when A concept teams play at home against C concept teams (46% of matches). However, the same figure warns about the number of crosses, which follows a principle similar to corners, presented and discussed earlier: precision is the fundamental aspect. Registering more crosses than opponents only guarantee a high winning percentage if these moves are correct and reach a teammate (57% of matches), otherwise crosses will not be beneficial, as the literature maintains.

Authors argue that losing teams have registered high crosses on average, which are associated with a decrease in the probability of winning matches (Lepschy et al., 2020; Zhou et al., 2018). In addition, there are studies that indicate goal predictions based on crosses in open play, such as in the 2014 FIFA World Cup, where only 3.2% of the 1332 crosses in open play resulted in goals scored (Pulling et al., 2018), or in the PL in the 2011/2012 season, in which Liverpool Football Club scored only 1 goal in a total of 421 crosses in open play (Kuper & Szymanski, 2014).

Complementarily, it is relevant to emphasize that a low chance of triumph due to the excessive use of open-play crosses occurs because this alternative limits the game proposal and the application of other attacking moves that may be presented as more pertinent to solve game problems, such as the use of penetrative passes (Passos et al., 2020; Tenga et al., 2017).

It is pointed out that crosses can be suitable attack solutions at certain moments of the match, so that they can be trained in order to gain more efficiency, such as positioning football players and the ball in the most recommended areas to increase the efficiency of scoring goals (Rocha-Lima, 2018). It is also considered that 64% of the goals scored in crosses are

scored with headers, and 22.4% of the goals scored and originated by crosses were also scored close to the back post, since 4 out of 5 goals are scored from crosses directed to this area (C. Hughes, 1990).

The literature also brings additional examples of how a German club managed to improve the efficiency of crosses, Bayern München, coached by Pep Guardiola. The said coach structured his team in order to maximize the actions of his wingers, allowing them to approach the opposing area and perform low and strong crosses near the first post, in order to give finishing opportunities to their attackers, to cause mistakes made by opposing defenders that can result in own goals and gain second balls - rebounds - advancing their midfielders in the offensive area to create numerical superiority, recover the ball close to the opponent's goal and manage to score a goal quickly (Perarnau, 2015).

Ultimately it adds up that set-piece crossing moves can make sense as there is time and space to achieve accuracy, but asking footballers to run down the flanks to deliver crosses all the time is a waste of time and effort, also because it becomes predictable and easy to defend against teams that already know what they are going to do in the matches, even more so if these teams only attack through one alternative and cannot find other alternatives to solve the problems of the match (Kuper & Szymanski, 2014), the relevance of being successful in the crosses performed and exploring game variables that indicate a high occurrence of victories is even more evident.

The results referring to the association between venue, ball possession time and total passes indicated that A concept teams won 53% of the matches played at home against C concept teams matches, these components - ball possession time and total passes, associated with the venue, were less relevant for teams to win matches, compared to the other venue associations, shots on goal and corners, which represented more than 63% of victories.

In addition, another interesting result was related to the time in possession of the ball with the total number of long passes. A concept teams, when they played at home, won 71% of the matches when they had this behavior on the field, but on the other hand, when they had less time in possession of the ball and more shots on target, they won 68% of the matches. These results suggest that ball possession time is not a consistent indicator to determine the teams' victory, which is corroborated by the literature, which mentions that this performance indicator has been widely discussed and presents a variety of results pointing to unrelated effects not only positive (Lane et al., 2020), but also negative (Lepschy et al., 2018).

In this sense, there are authors who also argue that ball possession approaches result in more stable attack movements and game proposals (Lago-Peñas & Dellal, 2010; H. Liu et al., 2015), in a greater chance of controlling the match actions (Lago-Peñas & Gómez-López, 2014) in higher numbers of goals scored (Yi et al., 2019), matches won (Collet, 2013; Grund, 2012; Lago-Peñas et al., 2010; McGuckin et al., 2020) and higher ranking positions (Anderson & Sally, 2013; Lago-Peñas & Dellal, 2010). However, there are also authors who call attention to the fact that ball possession time is less important within the soccer context (Lepschy et al., 2020) and that the ability of soccer players to perform short and long passes can influence the efficiency of game models (Fernandez-Navarro et al., 2016), which can support the aforementioned link between direct and indirect plays with finishing moves to obtain a high number of victories (Rocha-Lima et al., 2021b).

In the same way that authors claim that long passes are often ineffective and result in loss of ball possession (Reis et al., 2017), there are authors who consider ball possession a relevant performance indicator for success in soccer (Bate, 1988; Rocha-Lima, 2018; Stanhope, 2001). Complementarily, direct game approaches are also seen as beneficial for football teams at times when ball possession game models are not effective to win matches (Fernandez-Navarro et al., 2016; Tenga & Larsen, 2003), especially in the PL, league that the midfield consists of a fast passes area, not a control of the game one (Perarnau, 2017). The direct game is represented by accelerated, vertical defense-attack transitions and with few passes (Tenga & Larsen, 2003), while the indirect game is represented by having more time in possession of the ball and performing more passes (Wilson, 2013).

Despite the presence of authors who did not find significant differences between the direct and indirect approaches (Tenga et al., 2010) and who stated that the indirect game approaches are more beneficial for the production of goals than the direct approaches (Garratt et al., 2017; Hughes & Franks, 2005), the literature brings data that support the efficiency of direct play to score goals, verifying 61.8% of attack sequences of five or fewer passes (Hughes, 1990), or four or fewer passes in a row (Mitrotasios & Armatas, 2014), many attack sequences between 0 and 5 seconds (Barbosa, 2014), in addition to teams that achieved triumphs through direct play alternatives, such as Newcastle United (Wilson, 2013), added to Chelsea and Real Madrid coached by José Mourinho (Anderson & Sally, 2013). In addition, it is mentioned that direct game approaches increase the number of finishing opportunities, since the longer the time to carry out an attacking movement, the greater the time for the opposing team to reorganize itself defensively (C. Hughes, 1990), and a lower conversion rate of shots on target will also occur (Anderson & Sally, 2013).

Thus, since shots on target have effects in relation to the results of the match (Anderson & Sally, 2013; Elyakim et al., 2020; Konefał et al., 2018; Rocha-Lima, 2018; Zhou et al., 2018) and the direct and indirect approaches are adopted by football teams to score goals and win their matches, the inclusion of shots on target in the analysis of the efficiency of both approaches, as previously suggested, is not only relevant to verify the percentages of victories but it is also supported by the literature.

#### **4. Conclusion**

Assuming the results of the present study, it is possible to conclude that the teams' market value did not influence the competitive performance when analyzed separately, but, when associated with the venue, the teams with the highest market value (A and B concept), when playing at home, obtained the highest percentage of victories 57.9% and 52.6%, respectively, reinforcing the importance of playing at home for these teams to win in the PL. With regard to the association between market value, venue and tactical/technical aspects - shots on target, corners, crosses, ball possession and passes - in the results of the matches, the results showed differences only between teams of concepts A and C, with A concept teams, when they played at home and had more shots, won 55% of the matches, a figure that was increased to 67% when A concept teams, in home games, recorded more shots on target than the teams of concept C, suggesting that these variables are relevant to be explored during the matches, when one intends to win the PL matches.

Regarding the association between venue and corners, it can be concluded that the A concept teams, when they played at home and had more corners, won 52% of the matches, a percentage that rose to 63% when the A concept teams had more corners and more shots on target, suggesting that these game strategies represent a good combination to be explored in matches. Crosses also proved to be a relevant performance indicator to be used, but only if the A concept teams, when playing at home, manage more successful crosses than the opponents (wins in 57% of matches), since having more total crosses than visitors does not lead to a representative winning percentage (wins 46% of games).

Finally, the associations between venue, shots on target, ball possession and passes showed that concept A teams, when playing at home, won 53% of the matches when they had more time on the ball and total passes, but this percentage increases to 71% when they have more time in possession of the ball and more long passes, in addition to winning 68% of the matches when they have less time on the ball and more shots on target, showing that the time in possession of the ball, alone, is a variable which can be positive or negative, depending on which variable is associated with it. In addition, these results allow us to conclude that the direct game and the indirect game only provide good results for football teams if they are associated with better finishing moves than the opponents.

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