

Analysis of goal scoring in Copa America 2021

MOHD FARIDZ AHMAD¹, RAJA NURUL JANNAT RAJA HUSSAIN², WAN FIRDAUS WAN CHIK³,
MOHD HAFZAL ABDUL HALIM⁴

¹ Fakulti Sains Sukan & Rekreasi, Universiti Teknologi MARA, Cawangan Perlis, Kampus Arau, MALAYSIA

² Fakulti Sains Sukan & Rekreasi, Universiti Teknologi MARA, Cawangan Negeri Sembilan, Kampus Seremban, MALAYSIA

³ Fakulti Sains Sukan & Rekreasi, Universiti Teknologi MARA, Cawangan Sarawak, Kampus Samarahan, MALAYSIA

⁴ Fakulti Hospitaliti, Pelancongan & Kesejahteraan, Universiti Malaysia Kelantan, Kampus Kota, MALAYSIA

Published online: October 31, 2022

(Accepted for publication October 15, 2022)

DOI:10.7752/jpes.2022.10305

Abstract:

The most popular and influential sport across the world is called soccer. The Copa America is among the most broadly watched tournaments worldwide. In soccer, scoring a goal has become one of the most thrilling moments to observe, because it can determine the winning team. This study aims to investigate and compare the goal scoring trend (period: first half vs. second half, and area: inside vs. outside the penalty box) during the Copa America 2021 tournament. Additionally, we examined the goal scoring pattern in 28 matches (n=28), with a total of 65 goals scored (an average of 2.32 goals per match), utilizing hand notational analysis. According to the descriptive statistics, 44.6% (29 goals) were scored during the first half, while 55.4% (36 goals) were scored during the second. Additionally, 87.7% (57 goals) were scored inside the box, and only 12.3% (8 goals) were scored outside the area. As a result, there was no significant difference in the frequency of goals scored between the first and second half of the game. However, there was a significant difference in the frequency of goals scored between being inside and outside the penalty box, as scoring from inside the box was significantly higher. Future coaches should explore designing training programs that emphasize goal-scoring ability, not only for attackers, but also for midfielders and defenders. It is suggested that future research compares how goals were scored and determines their association with the playing pattern.

Key Words: - Inside the box, Outside the box, First half, Second half, Copa America

Introduction

The sport of soccer is the most popular, influential and attractive across the world. It has been practiced by almost every nation around the world (Koerte et al., 2016; Reilly & Duran, 2003), and has been played by males and females, and adults and children, at different levels of ability (Stølen et al., 2005; Ali & Talib, 2013). It is a team sport that is played on a pitch (approximately between 100m – 120m length x 60m - 90m wide in size). The ball is controlled with the feet frequently, and also other body parts, except for the hands. Interaction is made between eleven teammates and eleven opponents. Sometimes the referee contributes with different roles in the game (Aguilar, et.al, 2012).

The most anticipated activity by spectators and supporters is scoring a goal, as this moment has produced some of soccer's most memorable images, which have proven to be more iconic than the goal itself. It might become one of the most important aspects of the game, whether it occurs during a school friendly, an amateur soccer match, or the World Cup (Turner, 2012). Scoring goals is the ultimate determinant of a soccer team's overall performance (Jones et al., 2004; Tenga et al., 2010; Wright et al., 2011; Yiannakos & Armatas, 2006), becoming one of the most exciting and thrilling aspects of the game (Muhammad, Norasrudin & Rahmat, 2013; Mal, 1982; Mayes, 1975), as well as one of the key factors for the teams to achieve (Cachay & Thiel, 2000). This is due to the fact that scoring goals is crucial to any team's success (Hughes and Churchill, 2005). In soccer, the amount of goals scored can separate the winning team from the losing team. According to Njojorai (2013), a match winner is reflected by the team that scores consistently and more than their opponent's squad. Moreover, the overall number of goals scored correlates with national and international cup victories, as well as with final rankings (Bekris et al., 2013; Delgado-Bordonau et al., 2013; Kapidi et al., 2010). As the last three major international championships (World Cup and EURO Championship) were decided by a single goal, there have been numerous instances during which a single moment or group of actions determined the winner or loser (Clemente, 2012; Kempe, Vogelbein, & Nopp, 2016).

Scoring a goal can be done any time during the 90 minutes of the match duration, and might also come from multiple areas of the field. The duration for a single soccer match is 90 minutes, and might be extended to 120 minutes when the match enters a knockout stage, such as round 16, quarter-final, semi-final and final. In 90

minutes, the game is divided into two halves: the first half (45 minutes) and the second half (45 minutes). Previous studies have shown that the majority of goals scored were during the second half. In the FIFA World Cup 2018 in Russia, 63% (Kubayi, 2020) were scored in the second half. In the FIFA World Cup 2014 in Brazil (Michailidis, 2014), this figure was 57%. In the FIFA World Cup 2010 in South Africa (Njororai, 2013), this figure was 57.9%. In contrast, the OFC Nations Cup 2016 showed that slightly more goals were scored in first half, with 52.1% (Ahmad, Puad & Alaudin, 2020). In another perspective, scoring goals can be either from inside or outside the penalty box. Scoring from inside the box is reflected as players have a shorter distance towards the goal post, and this can cause difficulty towards the opponent's goalkeeper, since a shorter time is needed for any reaction to a strike to the goal (Yiannakos & Armatas, 2006). In contrast, the difficulty to enter into the penalty box is due to the complexity to break through the opponent's defender, which leads the attacking players to shoot from outside the box, as it has become the best method to make a shot towards the goal (Azhar, Shapie, Sulaiman & Mohamed, 2020).

To the best of our knowledge, the majority of previous studies focused on the analysis of goal scoring during the FIFA World Cup and EURO Championship such as FIFA World Cup 2018 (Kubayi, 2020), FIFA World Cup 2014 (Michailidis, 2014), FIFA World Cup 2010 (Njororai, 2013), FIFA World Cup 2006 (Acar et al., 2008), EURO Championship 2016 (Ahmad, Puad & Alaudin, 2020) and EURO Championship 2012 (Leite, 2013). However, there only a few studies that investigated goal scoring during Copa America tournament, such as the study by Lastella, Lovell and Rampinini (2018), which examines the goal scoring patterns of each half between Copa America 2016 and EURO 2016 Championship. However this previous study compared the period between continents. In addition, Ahmad, Puad and Alaudin (2020) analyzed the percentage of goal scoring between the first and second half among all continents' soccer tournaments, including Copa America 2016, but only reported the percentage of goals. To date, there is a lack of studies that analyse the difference of goal scoring between goal scoring period (1st half vs. 2nd half) and goal scoring area (inside vs. outside penalty box) during the Copa America tournament. Therefore, this study aims to identify the goal scoring patterns (i.e., area and period of goal scored) in the Copa America 2021 tournament.

Material & Methods

Hand notational analysis was performed on a total of 65 goals scored in 28 matches at the Copa America 2021 tournament in Brazil, which took place from 13 June to 10 July 2021. The videos were retrieved from the database on the website of the official federation (<https://copaamerica.com/en/>) and highlights from YouTube via official overviews of the games (<https://www.youtube.com/watch?v=cc-KAkMuXIU>). This study defined the game period as the frequency of goals scored during the 90th minute game time between the first and second halves (first half plus injury time and second half plus injury time). The goals scored after 90th minutes of play were disregarded, even during penalty shootouts. Previously, the goal scoring area was defined as both within and outside the penalty box. Inside the box was referred to as a goal scored from inside the penalty box, including penalty kicks, while outside the box was referred to as a goal scored outside of the penalty box (Fig. 1), including the goals that were score from insides of their own area. In addition, this study used the Mann Whitney to compare between half and area, since the data was not normally distributed.

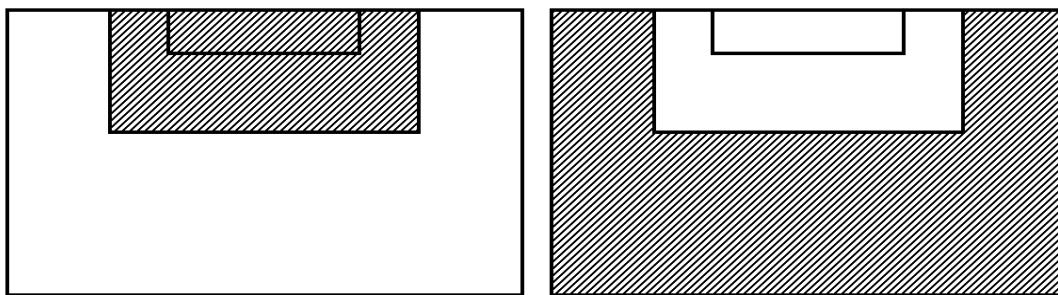


Fig. 1 Inside (left) and outside the box (right)

The reliability of this study was assessed via intra- and inter-reliability. Intra-reliability can be known as the data measured by an observer towards two or more trials, while inter-reliability refers to two or more observers who measure the same data (Koo & Li, 2016). To test intra-reliability, the observer watched the video twice, with a one-week interval between viewings, to prevent memory bias. For inter-reliability, two observers viewed the movie to identify the goal scoring period and region simultaneously (Darst, Zakrajsek, & Mancini, 1989; Zumana et al., 2019). The dependability of dependent variables was calculated using the Intraclass Correlation Coefficient (ICC). The intra- and inter-observer dependability of these performance measures is demonstrated by the occurrence of a substantial correlation between observations from different sessions and between observers (Table 1).

Table 1 Intra- and inter-reliability (ICC) values for goal scoring period and area

Rater	Intraclass Correlation Coefficient (ICC)
Intra-observer	1.00
Inter-observer	1.00

Results

Fig.2 shows that the goals were score based on the period of the game (1st vs. 2nd half) and area of goal (inside vs. outside the box). During the Copa America 2021, 44.6% (29 goals) were scored during the first half, while 55.4% (36 goals) were scored during the second half. In addition, there 87.7% (57 goals) originated from inside the box, while only 12.3 % (eight goals) originated from outside the box.

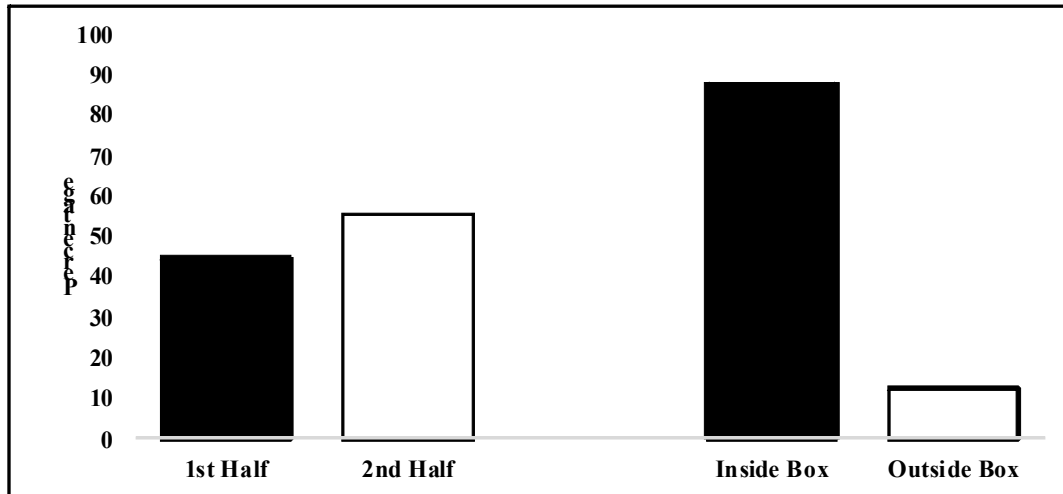


Fig. 2 Percentage of goal scoring between the match period (1st vs. 2nd half) and goal area (inside vs. outside)

According to Table 2, it can be concluded that there was no significant difference in goal scoring frequency between the first half and second of goals scored ($U = 361, p = .581$). Also, there was a significant different in goal scoring frequency between inside and outside the box ($U = 78.5, p = .000$), as it showed scoring from inside the box was more prevalent.

Table 2 Goal scoring frequency based on period and area of goal scored

Goal	Mean	SD	p-value
Period	1.16	.97	.581
Area	1.16	1.39	.000

Discussion

This study aims to distinguish between periods of play (1st vs. 2nd halves) and goal scoring area (inside vs. outside the box) throughout the Copa America 2021 tournament. The results indicate that there was no major difference between the first and second halves in terms of goal scoring. This finding is consistent with a study by Leite (2013), wherein the results showed no significant difference between the first and second halves of the EURO 2012 Championship in terms of goal scoring. This is a drawback of the study, as it only compares two areas, which may not produce statistically significant results. According to Bamplekis et al. (2021), the tactics of the winning team can influence the number of goals scored in the final few minutes of a match. This may be due to the coaches' use of substitutions or other strategies, such as the employment of a swarming defence. Making a change for a tactical purpose is the most direct approach to impact the game. Consequently, soccer coaches are compelled to allocate them extremely carefully (Myers, 2012), because Rule 3 of the Federation International Football Association (FIFA) only permits a maximum of three substitutions for each match (FIFA, 2014). However, due to the COVID-19 outbreak, FIFA issued temporary rules allowing clubs to employ up to five substitutes in order to protect player welfare amidst a packed fixture schedule (Reuters, 2021). As soccer began in the midst of the 2020 coronavirus pandemic, this rule was enacted with player welfare in mind (FIFA, 2020). As a result, this has become a tactical benefit for coaches, who now have various options for replacing players. This means that over half of each team's starting lineup can be replaced for tactical purposes, particularly in offensive modes. According to prior research, coaches in the UEFA Champions League and English Premier

League routinely make substitutions at halftime and during the second half, with the vast majority being attacking players (Bradley et al., 2014; Rey et al., 2015). According to Reilly et al. (2008), the employment of substitute players as a strategy to decrease team weariness directly increases the opportunity to score a goal, since their energy is still at peak level. On the other hand, elite players must recover quickly to maintain the highest possible intensity throughout the match (Bujnovsky et al., 2015), regardless of their physical ability, technical skills, tactical thinking, psychological characteristics (Mal et al., 2015), or whether they are first team or subs players (Mal et al., 2015). In reality, prior research (Bradley, Lago-Peas, and Rey, 2014; Padrón-Cabo et al., 2018) has shown that substitutions are typically made between halftime and the 55th and 85th minutes of the second half of the English Premier League and Spanish La Liga matches. Consequently, this indicates that the energy levels of starting and substitution players were nearly similar, indicating that there was no discernible difference between the game halves.

Apart from that, this study shows that during the Copa America tournament, scoring from inside the box was significantly higher compared to scoring from outside the box. The findings indicate that the goal scoring percentage from inside the box (87.7%) was much higher compared to the FIFA World Cup 2018 (84.7%) (Çobanoğlu, 2019), FIFA World Cup 2010 (82.1%) (Njororai, 2013) and FIFA World Cup 2006 (81%) (Acar et al., 2008), while lower compared to the FIFA World Cup 2014 (89.9%) (Rumpf et al., 2017). The results obtained in this study are in line to those by Yiannakos and Armatas (2006), who found that scoring from inside the penalty box was significantly higher compared outside the box, during the EURO 2004 championship. The possible factors might be due to the area of scoring the goals from inside the box was nearer to the goal post, which might lead to the increment of scoring opportunities, as mentioned upn by Sarkar and Chakraborty (2018).

This is also in line with the work by Michailidis et al. (2004), who mentioned that the increase in the recurrence rate of any offensive action and goals within the penalty area was justified by the area being closer to the goal, and was beyond the goalkeeper's range. Additionally, another study during the World Cup 2018 by Kvas-Cabral et al. (2022) revealed that European teams have a greater opportunity to score a goals when spending more time at the final third and in the penalty area, which might directly explain why scoring inside the box was significantly higher compared to outside the box. Another possible explanation might be due to the tactical play from coaches, which emphasizes more on ball penetration into the box such as dribbling and passing the ball behind the defenders (crossing and set piece), which can create more opportunities to score goals. This is in line with prior work whereby strikes were made to the goal from the penalty box, where the highest chance to score is (Cohen, 1975; Docherty, 1978; Njororai 1996a, b; 2004). This is also in line with the work by Mülazımoğlu et al. (2020), who investigated the UEFA Champions League group matches in the 2017-18 season, whereby the striker was brought together with the ball to enter the penalty area, especially within the goal zone, with a positional understanding of all of the offences.

Conclusions

As conclusion, during the Copa America 2021 tournament, the scored goals were nearly equal during the period of the match (1st and 2nd half), and a higher number of goals were scored from within the penalty box compared to outside of it. This can be related, as the area of goal scoring was nearer to the goal post, since it indirectly creates a better opportunity to score a goal. These findings can assist soccer coaches around the world to develop better training tactics and strategies for offensive and defensive sides in order to win matches and competitions. Furthermore, it is recommended to compare how goals were scored and identify their relationship with the style/patterns of play in future work.

Conflicts of interest – The authors have no conflicts of interests to declare.

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