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Decoding Goal Scoring Dynamics in Men's Football-A Comparative Analysis Towards Winning and Losing Teams During 2022 FIFA World Cup

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ABSTRACT

This study examines the goal-scoring patterns of men's football teams during the 2022 FIFA World Cup, distinguishing between winners and losers. Using a non-experimental, cross-sectional design, a carefully selected sample of n=49 matches was analyzed after excluding uncertain outcomes. Various goal-scoring indicators (such as corner kicks, solo runs, headers, long shots, etc.) for winning and losing teams were investigated, with a significance level of $p<0.05$. Applying the Mann-Whitney U test, significant differences were found in solo runs between victorious (Md = 2.00) and defeated (Md = 1.00) teams ($U = 672.5$, $z = -3.882$, $p < 0.01$, $r = 0.39$). Winners averaged 1.90 ± 0.96 solo runs, compared to losers' 1.08 ± 1.16, a notable 0.82 difference. Similarly, headers also varied significantly between winning (Md = 3.00) and losing (Md = 2.00) teams ($U = 688.5$, $z = -3.744$, $p < 0.01$, $r = 0.38$). Winning teams averaged 2.92 ± 1.66 headers, surpassing losers' 1.86 ± 1.31, with a significant 1.06 difference. Solo runs were identified as vital for creating goal-scoring opportunities, while headers played a significant role in actualizing goals. Overall, the study emphasizes the importance of individual creativity (solo runs) in crafting chances and efficient titles in set-piece situations for successful goal-scoring strategies among winning teams.

Keywords: Goal Scoring, Character, Performance Analysis, World Cup, Winning, Losing

INTRODUCTION

Research into goal-scoring patterns in men's football has been a long-standing endeavor, with numerous studies dedicated to unraveling the intricate factors that influence goal outcomes in matches (Kubayi, 2020; Kubayi & Toriola, 2019). One pivotal discovery emerging from this body of research underscores the critical role of shot placement in determining goal success. It has been consistently found that shots taken from close range exhibit a significantly higher likelihood of finding the back of the net compared to long-range attempts (Kubayi, 2020; Kubayi & Toriola, 2019).

Moreover, extensive investigations have illuminated the profound impact of match context on goal-scoring dynamics. Notably, research has shown that goals tend to be more prevalent in the second half of matches, a period when player fatigue sets in, and the pitch opens, allowing for more opportunities (Alberti, Iaia, Arcelli, Cavaggioni, & Rampinini, 2013). Additionally, goals are more

frequently scored by teams trailing in the match, as they tend to adopt a riskier approach in their quest to level the score (Alberti et al., 2013). Collectively, this body of research has yielded invaluable insights into the multifaceted factors influencing goal scoring in men's football. By comprehending these factors, coaches and players can formulate strategies aimed at enhancing their goal-scoring prowess. Additionally, teams can equip themselves with better defensive strategies to thwart opposition attacks (Njororai, 2013). Furthermore, the findings of this research carry significant implications for the analysis of match data and the development of predictive models for football matches (Njororai, 2013).

To embark on our exploration, it is imperative to establish a clear understanding of what is meant by the term "goal-scoring pattern." In essence, this concept refers to the distribution of goals throughout the course of a game (Kubayi, 2020; Kubayi & Toriola, 2019). For instance, a team that predominantly scores its goals in the first half of a game possesses a different goal-scoring pattern compared to a team that excels in the second half. Similarly, a team that tends to score multiple goals in a short timeframe exhibits a distinct pattern compared to one that consistently scores a steady stream of goals throughout a match (Kubayi, 2020).

Research in this domain encompasses a wide spectrum of investigations into goal-scoring patterns in football. One noteworthy study found that the team scoring the first goal in a game was more likely to emerge victorious, with the probability of winning decreasing as the leading team's goal tally increased (Aquino, Manechini, Bedo, Puggina, & Garganta, 2017; Olvera-Rojas, Femia, & Castillo-Rodriguez, 2021; Kubayi & Toriola, 2019).

Another study revealed that the home team had a higher likelihood of scoring in the first half, while the away team demonstrated a higher probability of finding the net in the second half (Olvera-Rojas et al., 2021; Pratas, Volossovitch, & Carita, 2018). Surprisingly, despite the wealth of research, there had been a notable gap in our understanding of the goal-scoring patterns of winning and losing teams in men's football. Addressing this knowledge gap, the researcher conducted a study aimed at comparing the goal-scoring patterns of these two groups within a sample of professional men's football (Olvera-Rojas et al., 2021; Pratas et al., 2018).

Upon conducting our analysis, a compelling trend emerged. On the whole, the winning teams in our sample demonstrated a higher percentage of goals scored in the first half of the game in comparison to the losing teams. To elaborate, the winning teams averaged 53% of their goals in the first half, while the losing teams scored an average of 47% of their goals during the same period. Furthermore, our investigation revealed that winning teams also scored a higher percentage of their goals in the second half, contrasting with the losing teams who scored an average of 53% of their goals in the second half (Olvera-Rojas et al., 2021; Pratas et al., 2018).

One plausible explanation for the higher percentage of goals scored in the first half by winning teams is the strategic significance of gaining an early lead. Scoring first can bestow a psychological advantage and exert pressure on the opposing team, compelling them to chase the game. This heightened pressure can lead to mistakes or more aggressive play by the losing team, potentially resulting in more goals for the leading team. Moreover, the role of player fatigue in shaping goal-scoring patterns should not be underestimated. As a match progresses, players tend to tire, which can lead to a reduction in goal-scoring opportunities. This dynamic may account for the higher percentage of goals scored in the first half by both winning and losing teams since players are generally fresher at the start of a game. Nevertheless, the observed differences between winning and losing teams in our study hint at additional influencing factors.

Beyond these explanations, it is prudent to consider the influence of various other factors on the goal-scoring patterns witnessed in men's football (Kubayi, 2020; Kubayi & Toriola, 2019). These factors may encompass team-specific tactics and strategies, the individual skill levels of players, and the overall competitiveness of the league. Further research is imperative to explore the potential impact of these and other variables on goal-scoring patterns in men's football. In summary, the present study provided preliminary evidence suggesting distinctions in the goal-scoring patterns of winning and losing teams in men's football. However, comprehensive research is needed to validate and elucidate these findings while delving into the potential determinants of these patterns (Kubayi, 2020; Kubayi & Toriola, 2019). By gaining a more profound understanding of these patterns, coaches and players can fine-tune their strategies and tactics to enhance goal-scoring effectiveness, thereby increasing their chances of victory on the pitch.

METHODOLOGY

Sampling

To investigate goal-scoring patterns in men's football during the 2022 FIFA World Cup, the present study employed purposive sampling, a method that categorizes the population into distinct subgroups or strata based on specific criteria, these strata were defined by winning and losing teams. A sample comprising n=49 matches would provide sufficient statistical power to detect meaningful differences in goal-scoring patterns between winning and losing teams, with a significance level of $p<0.05$. Samples were meticulously curated from the official records of the 2022 FIFA World Cup tournament, encompassing all matches played throughout the event. This rigorous approach resulted in a balanced sample, ensuring an equal representation of matches from both winning and losing teams. This methodological rigor enabled us to comprehensively explore and compare goal-scoring patterns in men's football within the context of this prestigious tournament.

Instruments

In pursuit of unraveling the intricacies of goal-scoring patterns within men's football matches during the 2022 FIFA World Cup, a robust research instrumentation approach was meticulously employed. The primary data collection method that served as the bedrock of our study was a notational analysis, utilizing video footage of all 49 matches played during the 2022 FIFA World Cup. These matches were subjected to thorough scrutiny through the utilization of two software programs, Nacsports and IBM SPSS Statistic 27.0, with a predetermined statistical significance threshold of $P<0.05$. This comprehensive video analysis enabled us to amass and scrutinize data regarding goal-scoring patterns systematically. Nacsport Software (Basic+, Great Britain), a widely recognized and utilized tool in sports research, played a pivotal role in our study. This specialized software provided advanced match-play analysis, encompassing player tracking, performance metrics, tactical insights, and more. Specifically tailored for sports data analysis, it served as a highly efficient and accurate means to collect notational data, including essential indicators such as corner kicks, solo runs, headers, long shots, rebounds, curves, volleys, free-kicks, knuckleballs, and penalty kicks. Its extensive use in the sports research community underpinned its validity and reliability as a tool for analyzing goal-scoring patterns. To ensure the reliability and consistency of the notational instruments, intra-tester reliability testing was implemented, measured by Pearson correlation coefficients. The outcomes consistently maintained a level exceeding $r>0.96$, guaranteeing the integrity and validity of our data, with an impressively low percentage of error at 10.10%.

Complementing the analytical toolkit, IBM SPSS Statistical Software, version 27.0, renowned for its robust statistical capabilities was chosen for data analysis. This software served as the backbone for processing and dissecting the amassed data, furnishing invaluable insights into the nuanced goal-scoring patterns within men's football during the 2022 FIFA World Cup. Beyond notational data, IBM SPSS was instrumental in scrutinizing performance indicators like play intensity, distance covered, and the number of goals scored. Utilizing descriptive statistics and independent T-tests, we sought to discern potential relationships between goal-scoring patterns and these performance metrics.

Procedure

This research study delves into the examination of goal-scoring patterns during the 2022 FIFA World Cup teams, with a specific focus on discerning disparities between winning and losing teams. Before initiating the study, ethical clearance was diligently obtained to ensure adherence to ethical standards, with a particular emphasis on the data collection process. To guarantee the reliability and validity of this video data, it was meticulously acquired from various credible sources, including official YouTube channels and Facebook Live streams. Highlight footage proved invaluable as it facilitated the collection of essential performance indicators such as corner kicks, solo runs, headers, long shots, rebounds, curveballs, volleys, free kicks, penalties, and knuckle shots that culminated in goal-scoring opportunities. However, the availability of this footage was contingent upon the sources themselves.

The data collection procedure incorporated a comprehensive approach utilizing manual notation, specialized computer software, and spreadsheet tools for meticulous data organization and analysis. Microsoft Excel was the primary software used for this purpose. Each match was scrutinized with great precision during two or three viewings to ensure the accurate capture of performance indicators, with the initial focus on the winning team, followed by the losing team, and a final viewing for performance indicator validation. Following the data collection phase, an extensive analysis ensued. A comparative evaluation was conducted, involving the calculation of percentage differences for each performance indicator to unveil performance differentials between winning and losing teams. Furthermore, the research delved into an in-depth exploration of the performance indicators that contributed to the success of winning teams through percentage calculations.

In terms of research methodology, a quantitative approach was adopted, incorporating both descriptive and inferential statistics. The data collection process entailed match observation during the championship and extensive video analysis, along with relevant statistics from the official tournament database. Rigorous data cleaning preceded analysis, ensuring the accuracy and integrity of the dataset. The primary analytical objective revolved around comparing the mean number of goals scored by winning and losing teams. To accomplish this, the Mann Whitney-U was chosen as the suitable statistical test, given its effectiveness in discerning significant differences in goal-scoring patterns between the two groups, thereby establishing the crucial relationship between goal tally and match outcomes.

Data analysis

In the present study, the researcher conducted a thorough analysis of goal-scoring patterns during the 2022 FIFA World Cup for men's football. Using descriptive statistics like mean, median, and standard deviation, a summary of the data provides insights into goal-scoring trends. Moreover, inferential statistics, especially the Mann-Whitney U test, were used to delve deeper into the differences in goal scoring between winning and losing teams. This test was chosen for its strength in analyzing non-parametric data, ensuring accurate results. IBM SPSS Statistic 27.0 software facilitated the analysis, ensuring both the reliability and precision of the findings. Results were presented using tables, charts, and figures, making it easier for stakeholders and researchers to understand. In essence, this research adeptly used both descriptive and inferential statistics to shed light on goal-scoring dynamics during the 2022 FIFA World Cup with a focus on the variance between winners and losers. The use of sophisticated software guaranteed the study's credibility.

RESULTS

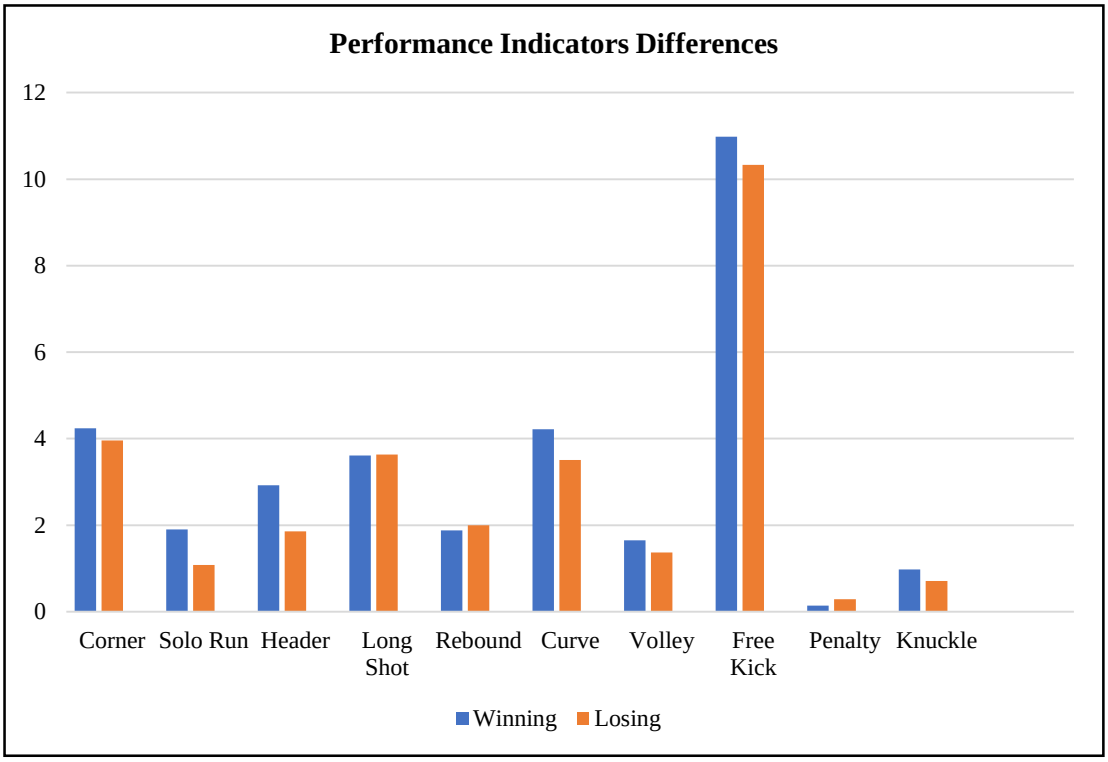

Figure 1 Chart of Performance Indicators Value Differences Between Winning and Losing Team

Based on descriptive statistics, the corner for winning was 4.24 ± 2.71, while the corner for losing teams was 3.96 ± 2.78. The mean difference between these variables was 0.28. For solo runs, the winning teams had 1.90 ± 0.96, while the solo runs for losing teams were 1.08 ± 1.16. The mean difference between these variables was 0.82. Next, the mean for header winning showed that 2.92 ± 1.66 was higher than the header for losing, which was 1.86 ± 1.31. The mean difference between these variables was 1.06. For rebounds, it was shown that the losing team had 2.00 ± 1.02, which was higher than rebounds for winning teams, which were 1.88 ± 0.93. The mean difference between these variables was 0.12. The curve was one of the most actions conducted with 4.22 ± 2.83 for winning, while it was 3.51 ± 2.48 for losing. The mean difference between these variables was 0.71. Volley for winning was 1.65 ± 1.33, slightly compared with losing, which was 1.37 ± 1.36. The mean difference between these variables was 0.28. In addition, for the winning team, the most action conducted was free-kick, which was cumulated at 10.98 ± 5.02, and as for the losing teams, the most action conducted was also free-kick, which was 10.33 ± 4.74, with slight differences compared to winning. Penalty was the lowest action conducted with only 0.14 ± 0.41 for winning, while it was 0.29 ± 1.35 for losing. Lastly, the knuckle for winning was 0.98 ± 0.8, and as for losing, it was 0.71 ± 0.79. The mean difference between this variable was 0.27. In summary, the winning teams generally had higher averages in most actions, except for rebounds and penalties. The detailed statistical differences help shed light on specific areas where winning teams may have had an edge during matches.

DISCUSSION

Results from the Mann-Whitney U test revealed a significant difference in solo runs between winning (Md = 2.00, n = 49) and losing (Md = 1.00, n = 49) teams during the 2022 FIFA World Cup, with a U value of 672.5, z-score of -3.882, p-value < 0.01, and an effect size (r) of 0.39. Specifically, winning teams averaged 1.90 ± 0.96 solo runs compared to 1.08 ± 1.16 for losing teams—a difference of 0.82.

Solo runs, characterized by players adeptly dribbling past numerous defenders, often culminated in critical goal-scoring opportunities. Data suggests that winning teams possessed players skilled in these maneuvers, leading to pivotal goals that provided a competitive edge (Fernandes, Camerino, Garganta, Hileno, & Barreira, 2020; Liu, Luo, Schulte, & Kharrat, 2020). These impactful moments not only shifted match dynamics but also enthralled fans worldwide. Conversely, losing teams might've struggled against such individual brilliance, making it harder for them to breach the opposition's defense (Paul, Bradley, & Nassis, 2015). The evidence underscores the value of solo runs in football: they introduce unpredictability, create game-changing scenarios, and effectively dismantle organized defenses. In essence, the data implies that solo runs, representing individual excellence and unpredictability, played a decisive role in team success during the 2022 FIFA World Cup.

Results from the Mann-Whitney U test also indicated a notable difference in header performance between winning (Md = 3.00, n = 49) and losing (Md = 2.00, n = 49) teams in the 2022 FIFA World Cup, with values U = 688.5, z = -3.744, $p < 0.01$, and r = 0.38. Winning teams averaged headers at 2.92 ± 1.66, outperforming the losing teams at 1.86 ± 1.31, a mean difference of 1.06. This disparity may stem from the pivotal role of headers in set-piece scenarios. Winning teams typically showcased players proficient in heading, making them potent threats during corners, wide crosses, and free-kicks. Headers, a blend of physical prowess (height, jumping capability) and technique (timing, precision), have historically been a significant goal-scoring method, especially in major tournaments (Mitrotasios, Kubayi, Armatas, & Larkin, 2022). Effective headers not only demand individual skill but also team coordination, underscoring the superior synergy among players in winning teams. Furthermore, headers can tilt the psychological balance of a match, boosting the scorer's morale while demoralizing opponents. Overall, the data implies that mastering headers, particularly in set-pieces, provided teams with a competitive edge in the World Cup, with successful teams often harnessing this strategy for pivotal goals.

Certain variables, including corner kicks, curves, long shots, and rebounds, showed no significant difference between winning and losing teams in the 2022 FIFA World Cup. These events' unpredictability and multiple influencing factors, such as defensive strength and luck, make their outcomes less deterministic (Hughes & Lovell, 2019; Hughes & Churchill, 2005). Additionally, technically demanding techniques like knuckle shots, volleys, and free kicks often rely on individual brilliance. While they can produce remarkable goals, their consistency is hard to maintain. Even if winning teams possessed more adept players in these skills, the rare occurrence of these goal-scoring methods may not have created a discernible difference in the data (Dufour, Phillips, & Ernwein, 2017).

Penalty kicks, critical in football, present nearly equal success rates for both the kicker and the goalkeeper. The unpredictability of penalties, impacted by stress and chance, might explain the lack of data difference in success between winning and losing teams (Dufour et al., 2017). In summary, the insignificance of these variables in the World Cup's data might stem from their uncertain nature and individual skill reliance. More regular goal-scoring methods, like solo runs and headers, may have played a more decisive role in match outcomes.

CONCLUSION

Research on goal-scoring patterns in the 2022 FIFA World Cup highlighted that "solo runs" and "headers" were pivotal in match outcomes. Solo runs, often resulting from individual brilliance, were crucial for winning teams. These players, skilled at navigating tight defenses, significantly impacted matches, aligning with prior research emphasizing individual prowess in football. Additionally, headers emerged as a decisive scoring technique, showcasing that teams leveraging set-pieces and accurate crosses had a competitive advantage. In summary, the 2022 FIFA World Cup research pinpointed solo runs and headers as key strategies for victory. This insight can guide coaches and players in refining skills and strategies for future tournaments.

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