Volume 07 Issue 03 (2026) Pages 239-247

INSPIREE: INDONESIAN SPORT INNOVATION REVIEW

ISSN 2746-6965 (Online), 2774-2520 (Print)
Journal Homepage: https://inspiree.review/index.php/inspiree

ORIGINAL RESEARCH ARTICLES

OPEN ACCESS

Predicting Match Success Through Scoring Efficiency in Elite Men's Indoor Hockey: Field Goals Versus Penalty Corners

https://doi.org/10.53905/inspiree.v7i03.186

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ABSTRACT

The purpose of the study. Men's indoor hockey is a high-intensity invasion sport in which goal-scoring efficiency serves as a critical determinant of competitive success. Despite the strategic importance of different scoring modes, comparative investigations examining the relative relationships between field goals, penalty corner goals, and match outcomes remain limited, particularly in Southeast Asian elite competitions. This study aimed to examine and compare the relationships between field goals, penalty corner goals, and team victories in men's indoor hockey at the SEA Games 2025.

Materials and methods. A quantitative observational design employing systematic notational analysis was applied to 26 team–match observations derived from 13 official matches involving five national teams. Match outcome was coded as win (1) or loss (0), while field goals and penalty corner goals served as independent variables. Descriptive statistics, Kolmogorov–Smirnov and Shapiro–Wilk normality tests, Spearman's rank correlation, Mann–Whitney U tests, and binary logistic regression were employed to analyze the data.

Results. Field goals accounted for 60.0% of total goals (n = 72), while penalty corner goals contributed 40.0% (n = 48). Both scoring modes were significantly associated with match outcome; however, penalty corner goals exhibited a stronger correlation with victories ($\rho = .788$, $p < .001$) than field goals ($\rho = .583$, $p = .002$). The Mann–Whitney U test confirmed significantly higher scoring ranks for winning teams in both categories, with a larger separation observed for penalty corner goals ($U = 11.00$, $Z = -3.94$, $p < .001$). Logistic regression indicated that a one-goal increase in penalty corner goals was associated with a 12.09-fold increase in the odds of winning (Exp(B) = 12.09), compared with a 5.23-fold increase for field goals. The model explained 86% of the variance in match outcome (Nagelkerke $R^2 = .86$) with 88.5% classification accuracy.

Conclusions. Although open-play goals provide the primary scoring volume, penalty corner efficiency plays a more decisive role in determining team victories in elite men's indoor hockey. These findings offer evidence-based insights for tactical planning and training prioritization in competitive indoor hockey.

Keywords: indoor hockey; field goals; penalty corner goals; team victories; performance analysis; SEA Games.

ARTICLE INFO

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ARTICLE HISTORY
Received : February 23, 2026
Accepted : May 05, 2026.
Published: September 27, 2026.

CITATION
Sandrea, A. G. A. V., Widodo, A., Wismanadi, H., Hidayat, T., Pudjijuniarto, P., & Muhammad, H. N. (2026). Predicting Match Success Through Scoring Efficiency in Elite Men's Indoor Hockey: Field Goals Versus Penalty Corners. *INSPIREE: Indonesian Sport Innovation Review*, 7(03), 239-247. https://doi.org/10.53905/inspiree.v7i03.186

INTRODUCTION

Men's indoor hockey represents a tactically demanding invasion sport characterized by rapid ball circulation, compressed playing dimensions, and continuous transitions between attacking and defensive phases that impose elevated technical and cognitive requirements on players (Mallo, 2020; McGuinness et al., 2017, p. 3108). The reduced court dimensions inherent to the indoor format amplify spatial constraints, accelerating the tempo of play and necessitating superior decision-making efficiency under conditions of heightened temporal and spatial pressure (Antonov et al., 2021; Zhao et al., 2025, p. 8). Within elite multi-sport competitions such as the Southeast Asian Games, performance differentials between participating national teams are frequently marginal, positioning goal-scoring efficiency as a pivotal factor in determining competitive outcomes (Lamas et al., 2020). Contemporary performance analysis

[abcde]Authors'Contribution: a-Study design; b-Data collection; c-Statistical analysis; d-Manuscript preparation; e-Funds collection.
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literature consistently demonstrates that match success in invasion team sports is more closely associated with the effectiveness of scoring opportunity conversion than with possession volume, territorial dominance, or gross attacking frequency (Cooper & Pulling, 2020; Sarmento et al., 2022).

Goals in men's indoor hockey emerge from two principal scoring modes: field goals originating from open-play sequences and goals derived from penalty corners as structured set-play situations (Morris-Binelli, 2020; Pratama et al., 2025). Field goals reflect the quality of collective attacking processes, encompassing coordinated off-the-ball movement, ball circulation under defensive pressure, spatial exploitation within the shooting circle, and synchronized finishing actions (Rico-González et al., 2020, p. 29; Stöckl & Morgan, 2013). Performance analysis research in invasion sports demonstrates that successful teams typically achieve a higher proportion of open-play goals, reflecting sustained attacking superiority and tactical coherence across match phases (Ávila-Moreno et al., 2018; Lord et al., 2020). Conversely, penalty corners constitute a distinct scoring context characterized by controlled execution, predefined tactical roles, and rehearsed routines that enable teams to exploit structured opportunities under reduced defensive uncertainty (Knoester & De Leeuw, 2025; Vinson et al., 2013).

Empirical investigations across multiple hockey formats have consistently identified penalty corners as high-impact scoring opportunities that account for a substantial proportion of total goals in elite-level competitions (Laird & Sutherland, 2003; Lignell et al., 2020). The indoor format, with its compressed playing area, increases the incidence of defensive infringements proximate to the shooting circle, thereby enhancing the strategic relevance of penalty corner execution (Antonov et al., 2021). Higher penalty corner conversion rates have been associated with competitive advantage, particularly in matches characterized by narrow score margins, where the capacity to convert structured opportunities becomes a decisive performance differentiator (Hughes et al., 2025). Technical determinants such as shot selection, execution velocity, deceptive variation, and the proficient application of drag-flick techniques have been identified as critical factors influencing penalty corner outcomes at the international level (Ahmad et al., 2024; Morris-Binelli et al., 2020).

Despite the expanding body of hockey performance analysis research, several significant gaps persist in the current literature. First, the majority of existing studies focus predominantly on the outdoor format, with considerably less empirical attention directed toward indoor hockey despite its distinct tactical and physiological demands (Cullinane et al., 2024; Lames, 2023). Second, while descriptive analyses of goal-scoring distributions are relatively common, investigations that directly link specific goal types to match outcomes through inferential statistical procedures remain comparatively scarce (Sarmento et al., 2022). Third, empirical evidence derived from Southeast Asian elite competitions is particularly limited, despite the region's distinct developmental characteristics and its growing significance in the international hockey landscape (Fridvalszki et al., 2025). These gaps constrain the capacity of coaches and performance analysts to develop evidence-based tactical strategies that are contextually relevant to the competitive environments in which they operate.

This study addresses these identified gaps by examining the comparative relationships between field goals, penalty corner goals, and team victories in men's indoor hockey at the SEA Games 2025. The investigation integrates descriptive, correlational, and predictive statistical approaches to provide a comprehensive analysis of how different scoring modes relate to competitive success. It is hypothesized that both field goals and penalty corner goals are positively associated with winning outcomes, with penalty corner goals demonstrating a stronger relative influence on match success due to the controlled execution context and higher conversion probability inherent to set-play situations. Identification of the scoring modes most strongly associated with winning outcomes is expected to contribute evidence-based insights for tactical planning, training prioritization, and performance optimization in elite men's indoor hockey.

MATERIALS AND METHODS

Participants and Competition Context

The study sample comprised all matches played in the men's indoor hockey tournament at the SEA Games 2025, held in Thailand. A total of 13 matches were analyzed, producing 26 team–match observations (N = 26). Five national teams participated in the tournament: Thailand, Malaysia, Indonesia, the Philippines, and Singapore. All matches from the group stage through the knockout phase, including classification and medal matches, were included to ensure full representation of competition performance. This census sampling approach eliminated selection bias and maximized the ecological validity of the dataset (Lames, 2023).

Study Design and Organisation

This study employed a quantitative observational research design based on systematic notational analysis to examine the relationships between field goals, penalty corner goals, and match outcomes in men's indoor hockey at the SEA Games 2025 (O'Donoghue et al., 2017). The design was correlational in nature and aimed to identify statistical associations between goal-scoring modes and competitive success without inferring causal relationships. Notational analysis was selected as the methodological framework due to its established validity in performance analysis research across invasion team sports. The dependent variable was match outcome, operationalized as a binary variable coded as win (1) or loss (0). Matches decided by shoot-out were coded as wins for the shoot-out winner and losses for the opposing team. The independent variables were the number of field goals and the number of penalty corner goals scored by each team in each match. All variables were treated as count data at the team–match level.

Data Sources and Collection Procedures

Match performance data were obtained from the official website of the International Hockey Federation (FIH). Official match reports, play-by-play summaries, and statistical records published on the FIH platform were used as primary data sources. Data were recorded at the team–match level for each fixture. For every match, the total number of goals scored by each team and the corresponding match outcome were extracted. All goals scored during regulation time and decisive phases, including shoot-outs where

applicable, were included in the dataset. Goals were classified using a standardized coding framework aligned with official hockey performance analysis conventions. Field goals were operationally defined as goals scored during open-play situations without a preceding set-play restart. Penalty corner goals were defined as goals scored directly following the award of a penalty corner, including drag-flick conversions, deflections, and direct shots from the set-play routine. Penalty stroke goals were documented for completeness but were excluded as independent variables in the main analyses due to their limited frequency (n = 0).

Statistical Analysis

Descriptive statistics were calculated for all variables, including minimum, maximum, mean, standard deviation, and total frequencies. Distributional characteristics were assessed using the Kolmogorov–Smirnov and Shapiro–Wilk tests to evaluate normality assumptions. As both field goals and penalty corner goals exhibited significant deviations from normal distribution, non-parametric statistical procedures were applied in all subsequent inferential analyses. Spearman's rank correlation coefficient (ρ) was used to examine bivariate associations between scoring modes and match outcome. Differences in scoring performance between winning and losing teams were analyzed using the Mann–Whitney U test, with mean rank comparisons used to quantify the magnitude of group separation. Statistical significance was set at $\alpha = .05$ for all tests. To assess the combined influence of field goals and penalty corner goals on the probability of winning, binary logistic regression analysis was conducted using the enter method. Model fit was evaluated using the omnibus test of model coefficients, Nagelkerke R^2, classification accuracy, and the Hosmer–Lemeshow goodness-of-fit test. Odds ratios (Exp(B)) were calculated to estimate the relative contribution of each scoring mode to match outcome. All statistical analyses were performed using IBM SPSS Statistics (Version 29.0). Two-tailed tests were applied throughout.

To ensure data reliability, all goal classifications were independently cross-checked against official match summaries published on the FIH website. A consistent coding framework was applied across all 13 matches to minimize recording errors and ensure coding consistency. Intra-rater reliability was assessed through re-coding of a random subsample of three matches (23.1%), yielding a Cohen's kappa of .96, indicating near-perfect agreement. Inclusion of all tournament matches enhanced ecological validity, while the use of official FIH competition data supported content validity

Ethical Considerations

The study analyzed secondary data derived exclusively from publicly accessible records published by the International Hockey Federation. No personal, medical, or otherwise sensitive athlete information was collected or utilized. Ethical approval was not required for this investigation, as the research involved non-invasive analysis of publicly available competition data, consistent with established ethical guidelines for observational sports performance research.

RESULTS

The analysis comprised 26 team–match observations derived from 13 matches played during the men's indoor hockey tournament at the SEA Games 2025. A total of 120 goals were recorded across the competition. Descriptive analysis was conducted to characterize the distribution and variability of each scoring mode.

Table 1. Overall Distribution of Scoring Modes Across All Team–Match Observations

Goal Type	Total Goals	Percentage (%)
Field Goals	72	60.0
Penalty Corner Goals	48	40.0
Total	120	100.0

As presented in Table 1, field goals accounted for 72 goals (60.0%), while penalty corner goals contributed 48 goals (40.0%). Open-play situations constituted the primary source of scoring during the tournament; however, penalty corners represented two-fifths of all goals, demonstrating their substantial contribution to overall scoring output. To provide a clearer visual summary of the overall scoring composition, Figure 1 presents the proportional distribution of field goals and penalty corner goals across all team–match observations.

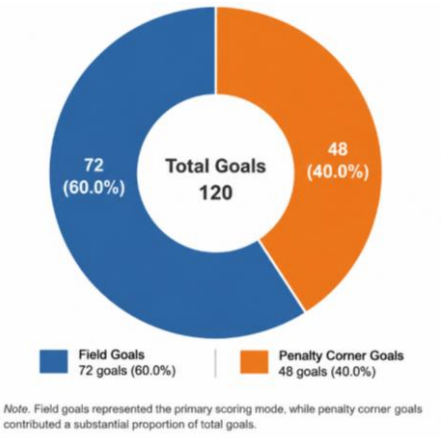


Figure 1. Distribution of Goal-Scoring Modes Across the Tournament. Field goals accounted for the largest proportion of total scoring output, contributing 72 goals or 60.0% of all goals recorded. Penalty corner goals contributed 48 goals or 40.0%, indicating that set-play situations represented a substantial source of scoring in men's indoor hockey at the SEA Games 2025.

As shown in Figure 1, field goals constituted the dominant scoring mode across the tournament. Nevertheless, the 40.0% contribution of penalty corner goals highlights the strategic importance of set-play efficiency in elite men's indoor hockey performance.

Table 2. Descriptive Statistics of Field Goals and Penalty Corner Goals (N = 26)

Variable	Min	Max	M	SD	Sum	N
Field Goals	0	14	2.77	3.19	72	26
PC Goals	0	5	1.85	2.01	48	26

Table 2 indicates that teams scored an average of 2.77 field goals per match (SD = 3.19) compared with 1.85 penalty corner goals per match (SD = 2.01). Field goals exhibited a wider range (0–14) and greater dispersion than penalty corner goals (range 0–5), indicating that open-play scoring was more variable across matches, whereas penalty corner scoring occurred within a narrower performance band.

Normality Test Results

Table 3. Normality Test Results for Scoring Variables

Variable	K–S p	Shapiro–Wilk p
Field Goals	.011	< .001
PC Goals	< .001	< .001

As shown in Table 3, both field goals and penalty corner goals significantly deviated from a normal distribution ($p < .05$ for all tests), justifying the application of non-parametric statistical procedures in all subsequent inferential analyses.

Spearman's Rank Correlations Between Scoring Variables and Match Outcome

Table 4. Spearman's Rank Correlations Between Scoring Variables and Match Outcome

Variable	FG	PC	Match Outcome
Field Goals	1.000	.468*	.583**
PC Goals	.468*	1.000	.788**
Match Outcome	.583**	.788**	1.000

Note. *p < .05. **p < .01.

Table 4 reveals that both scoring modes were significantly associated with match outcome. Field goals demonstrated a moderate positive correlation with victory ($\rho = .583$, $p = .002$), while penalty corner goals exhibited a strong positive correlation ($\rho = .788$, $p < .001$). The inter-correlation between field goals and penalty corner goals ($\rho = .468$, $p = .016$) indicates that teams with higher open-play attacking output also tended to score more frequently from set-play situations, suggesting a general scoring competency factor.

To provide a clearer visual representation of the strength of association among scoring modes and match outcome, Figure 2 presents a Spearman correlation heatmap. This visualization highlights the comparative magnitude of the relationships between field goals, penalty corner goals, and match outcome.

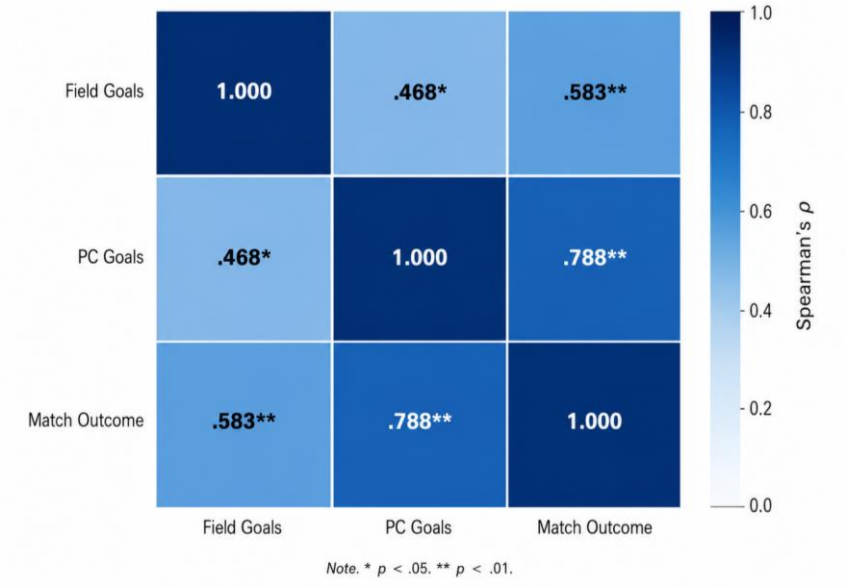


Figure 2. Spearman Correlation Heatmap Between Scoring Modes and Match Outcome

As shown in Figure 2, penalty corner goals exhibited the strongest positive association with match outcome, indicating that teams scoring more frequently from penalty corners were more likely to win matches. Although field goals were also significantly associated with victory, the magnitude of the correlation was lower than that observed for penalty corner goals. This pattern supports the interpretation that penalty corner efficiency represents a more decisive scoring factor in determining match success in elite men's indoor hockey. The moderate correlation between field goals and penalty corner goals further suggests that successful teams tend to demonstrate scoring effectiveness across both open-play and set-play contexts.

Comparison of Scoring Variables by Match Outcome

Table 5. Mean Rank Comparison of Scoring Variables by Match Outcome

Variable	Result	n	Mean Rank	Δ Rank

Field Goals	Loss	13	9.19	8.62
	Win	13	17.81	
PC Goals	Loss	13	7.85	11.30
	Win	13	19.15	

Table 5 demonstrates that winning teams consistently achieved higher mean ranks for both scoring modes. The mean rank difference for penalty corner goals (11.30 points) exceeded that for field goals (8.62 points), indicating a stronger separation between winning and losing teams based on penalty corner scoring performance.

Scoring Differences Between Winning and Losing Teams

Table 6. Mann–Whitney U Test Results for Scoring Differences Between Winning and Losing Teams

Variable	U	Z	p
Field Goals	28.50	−2.92	.004
PC Goals	11.00	−3.94	< .001

As shown in Table 6, both scoring modes differed significantly between winning and losing teams. The lower U value (11.00) and larger absolute Z score (−3.94) for penalty corner goals indicate a stronger discriminatory effect compared with field goals (U = 28.50, Z = −2.92, p = .004), confirming that penalty corner scoring more effectively differentiates match outcomes.

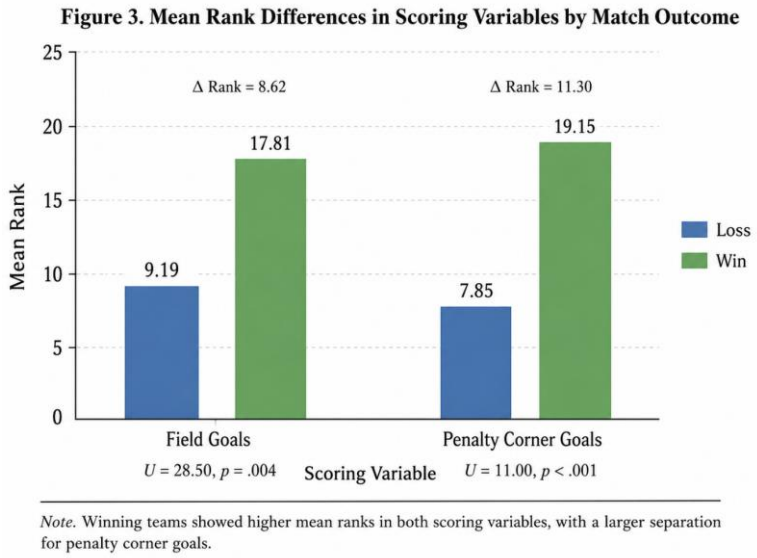


Figure 3. Mean Rank Differences in Scoring Variables by Match Outcome. The figure compares the mean ranks of field goals and penalty corner goals between winning and losing teams. Winning teams showed higher mean ranks in both scoring variables. The rank separation was larger for penalty corner goals (Δ Rank = 11.30; U = 11.00, p < .001) than for field goals (Δ Rank = 8.62; U = 28.50, p = .004), indicating that penalty corner scoring more strongly differentiated match outcomes.

As illustrated in Figure 3, winning teams consistently recorded higher mean ranks than losing teams for both field goals and penalty corner goals. However, the difference was more pronounced for penalty corner goals, suggesting that set-play scoring efficiency provided a stronger discriminatory indicator of match success. This finding reinforces the Mann–Whitney U test results and supports the interpretation that penalty corner goals represent a more decisive scoring variable in elite men's indoor hockey.

Regression Model Fit and Classification Accuracy

Table 7. Binary Logistic Regression Model Fit and Classification Accuracy

Indicator	Value
Omnibus χ^2 (df = 2)	26.95
p-value	< .001
Nagelkerke R^2	.86
Overall Classification Accuracy	88.5%
Hosmer–Lemeshow p	.999

Table 7 indicates that the logistic regression model was statistically significant ($\chi^2(2) = 26.95$, p < .001) and explained 86% of the variance in match outcome (Nagelkerke R^2 = .86). The model correctly classified 88.5% of cases, and the non-significant Hosmer–Lemeshow test (p = .999) confirmed excellent model fit.

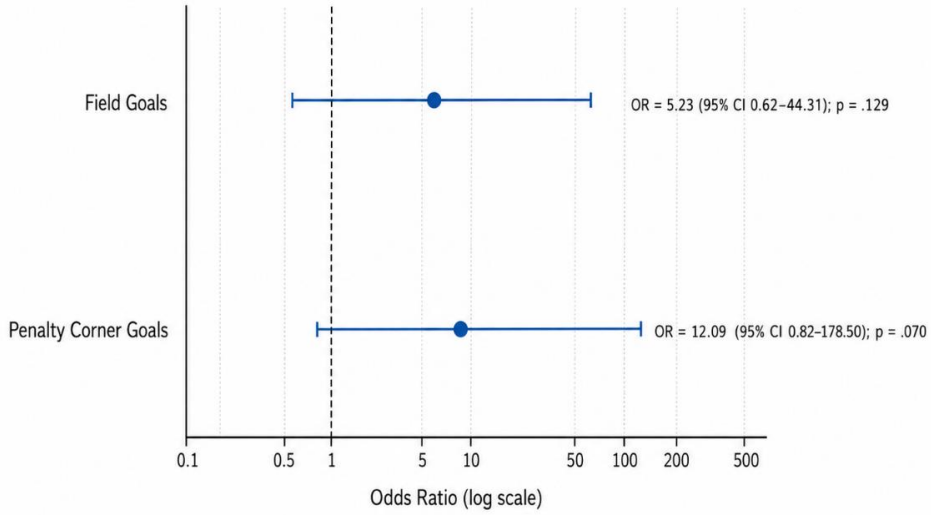
Regression Coefficients Predicting Match Victory

Table 8. Logistic Regression Coefficients Predicting Match Victory

Predictor	B	SE	Wald	p	Exp(B)	95% CI
Field Goals	1.655	1.091	2.30	.129	5.23	0.62–44.31
PC Goals	2.492	1.373	3.29	.070	12.09	0.82–178.5

Table 8 reveals that both scoring modes increased the likelihood of winning, with odds ratios exceeding 1.0. A one-goal increase in field goals was associated with a 5.23-fold increase in the odds of winning (B = 1.655, Wald = 2.30, p = .129), whereas a one-goal

increase in penalty corner goals was associated with a 12.09-fold increase (B = 2.492, Wald = 3.29, p = .070). Although neither individual predictor reached statistical significance at the .05 level when entered simultaneously—likely attributable to the limited sample size (N = 26) and the resulting reduction in statistical power—the substantially larger odds ratio for penalty corner goals indicates a stronger relative influence on match outcome.



Note. Both scoring variables increased the odds of winning, with a stronger relative effect observed for penalty corner goals.
Model summary: Omnibus $\chi^2(2) = 26.95$, $p < .001$; Nagelkerke $R^2 = .86$; classification accuracy = 88.5%; Hosmer–Lemeshow p = .999.

Figure 4. Odds Ratios of Scoring Variables Predicting Match Victory: The forest plot displays the odds ratios and 95% confidence intervals for field goals and penalty corner goals as predictors of match victory. Both scoring variables showed odds ratios above 1.0, indicating a positive association with the likelihood of winning. Penalty corner goals showed a larger odds ratio (OR = 12.09; 95% CI = 0.82–178.50; p = .070) than field goals (OR = 5.23; 95% CI = 0.62–44.31; p = .129), suggesting a stronger relative predictive contribution to match outcome.

As shown in Figure 4, both field goals and penalty corner goals increased the odds of match victory. However, penalty corner goals demonstrated a higher odds ratio than field goals, indicating a stronger relative contribution to winning probability. Although the confidence intervals were wide and crossed the null value of 1.0, likely due to the limited tournament sample size, the overall logistic regression model showed strong explanatory and classification performance. This finding supports the interpretation that penalty corner scoring efficiency may play a more decisive role than open-play scoring in predicting victory in elite men's indoor hockey.

DISCUSSION

This study analyzed 26 team–match observations from 13 matches in the men's indoor hockey tournament at the SEA Games 2025 and identified meaningful differences in scoring patterns between winning and losing teams. The findings provide empirical evidence that, while field goals constitute the dominant source of scoring volume, penalty corner goals exert a disproportionately stronger influence on match outcomes. These results extend the existing performance analysis literature by providing context-specific evidence from an elite indoor hockey competition in a Southeast Asian setting, an area previously underrepresented in the scholarly discourse (Manuel et al., 2021, p. 10; Sarmento et al., 2022, p. 12).

The observed distribution of scoring modes—60.0% field goals and 40.0% penalty corner goals—is broadly consistent with patterns reported in outdoor hockey research, where open-play goals typically comprise the majority of total scoring output. However, the 40% contribution of penalty corner goals in the present study is notably higher than proportions reported in some outdoor tournaments, potentially reflecting the compressed playing dimensions of the indoor format, which increase the frequency of defensive infringements within the shooting circle and thereby elevate the incidence of penalty corner awards (Antonov et al., 2021). This finding supports the theoretical proposition that the indoor environment amplifies the tactical significance of set-play proficiency relative to the outdoor game.

The stronger correlation between penalty corner goals and match outcome (ρ = .788) compared with field goals (ρ = .583) aligns with previous research identifying set-plays as high-impact scoring situations in elite hockey (Laird & Sutherland, 2003; Vinson et al., 2013). Penalty corners afford teams the opportunity to execute rehearsed tactical patterns under controlled conditions, producing higher scoring probabilities than many open-play situations characterized by defensive uncertainty and spatial unpredictability. The finding that winning teams demonstrated a larger separation from losing teams in penalty corner scoring (mean rank difference = 11.30) than in field goal scoring (mean rank difference = 8.62) reinforces this interpretation. The capacity to convert structured opportunities appears to be a more reliable discriminator of competitive success than open-play scoring volume, consistent with the broader performance analysis literature in invasion sports (Cooper & Pulling, 2020; Lignell et al., 2020).

The logistic regression analysis further substantiated the differential predictive value of the two scoring modes. The odds ratio for penalty corner goals (Exp(B) = 12.09) was more than twice that for field goals (Exp(B) = 5.23), indicating that each additional

penalty corner goal conferred a substantially greater increase in the probability of winning. Although neither predictor reached conventional significance thresholds when entered simultaneously, this outcome is attributable to the constrained sample size (N = 26) and the consequent limitation in statistical power, rather than to the absence of a meaningful effect. The overall model demonstrated strong predictive capacity (Nagelkerke R^2 = .86; classification accuracy = 88.5%), confirming that the combined scoring profile effectively discriminates between winning and losing outcomes. These findings are consistent with logistic regression analyses reported in similar performance analysis studies across team invasion sports (Ávila-Moreno et al., 2018; Lames, 2023).

The moderate positive correlation between field goals and penalty corner goals (ρ = .468) suggests that high-performing teams tend to maintain effectiveness across multiple scoring contexts rather than relying exclusively on a single mode of attack. This inter-correlation indicates the presence of a general attacking competency(Huo et al., 2024, p. 2)—encompassing technical proficiency, tactical decision-making, and collective coordination—that manifests across both open-play and set-play situations(He et al., 2023, p. 50; Prieto-González et al., 2024). From a coaching perspective, this finding implies that investment in either scoring mode is not mutually exclusive; rather, improvements in overall attacking quality may yield benefits across both scoring channels .

The practical implications of these findings for coaching and performance analysis are considerable. First, the strong association between penalty corner goals and winning outcomes justifies increased emphasis on structured penalty corner training within competition preparation programs. Coaches should prioritize the development of varied penalty corner routines, including drag-flick execution, deceptive variations, and rapid redistribution options, to maximize conversion rates (Morris-Binelli et al., 2020; Pratama et al., 2025). Second, the importance of field goal volume—representing 60% of total scoring—necessitates sustained investment in open-play attacking development, including ball circulation under pressure, spatial exploitation, and coordinated finishing within the shooting circle (Lord et al., 2020; Stöckl & Morgan, 2013). Third, performance analysts should monitor both scoring modes as complementary indicators of team effectiveness, using multivariate approaches rather than univariate metrics to assess competitive readiness (Fridvalszki et al., 2025).

Several limitations should be acknowledged. The sample was restricted to a single tournament (SEA Games 2025), comprising 13 matches and 26 team–match observations, which constrained statistical power for the logistic regression analysis. The generalizability of findings to other competitive contexts, including European or World Championship tournaments, requires further investigation. The study did not account for contextual variables such as match status, score differential, or stage of competition, which may influence scoring patterns. Additionally, the analysis was limited to goal counts and did not incorporate process-level data such as shooting attempts, penalty corner conversion rates, or spatial characteristics of attacking sequences. Future research should address these limitations through larger, multi-tournament datasets and more granular performance metrics.

CONCLUSION

This study demonstrates that both field goals and penalty corner goals are significantly associated with team victories in men's indoor hockey at the SEA Games 2025. Field goals accounted for the majority of scoring output (60.0% of total goals), confirming the fundamental importance of open-play attacking quality. However, penalty corner goals demonstrated a consistently stronger relationship with winning outcomes, evidenced by higher correlation values (ρ = .788 vs. .583), larger performance differences between winning and losing teams (mean rank difference = 11.30 vs. 8.62), and a greater increase in winning probability per additional goal scored (Exp(B) = 12.09 vs. 5.23). These findings indicate that while open-play scoring provides the primary goal volume, penalty corner efficiency plays a more decisive role in determining match success in elite indoor hockey.

The theoretical contribution of this study lies in extending the performance analysis framework for indoor hockey by demonstrating the differential predictive value of distinct scoring modes, providing empirical evidence from an underrepresented competitive context. Practically, these findings support a dual emphasis in coaching practice: sustained development of open-play attacking capabilities alongside systematic enhancement of penalty corner routines, with particular attention to conversion efficiency under competitive conditions. Future research should expand the analytical scope to include multi-tournament datasets, incorporate process-level metrics such as shot attempts and conversion rates, and examine the interaction between scoring modes and contextual variables including match status and opposition quality.

ACKNOWLEDGMENTS

The authors express their gratitude to the International Hockey Federation (FIH) for providing publicly accessible competition data. Appreciation is extended to the Faculty of Sport and Health Science, Universitas Negeri Surabaya, for institutional support.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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