



Performance indicators associated with Indonesia's consecutive gold-medal success in the 2023 and 2025 SEA games indoor hockey finals

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Abstract

Background: Performance analysis is increasingly utilized in elite sports to identify key factors contributing to competitive success. However, limited evidence is available regarding the performance indicators underlying Indonesia's consecutive gold-medal achievements in international indoor hockey competitions.

Aims: This study aimed to identify and compare the performance indicators associated with the Indonesian Men's National Indoor Hockey Team's success in the 2023 and 2025 SEA Games finals against Malaysia.

Method: A quantitative descriptive design employing match performance analysis was adopted. Data were collected from official match statistics and video recordings of the 2023 and 2025 SEA Games finals. The analyzed variables included shots, shots on target, goals scored, successful passes, ball possession, interceptions, attack blocks, goalkeeper saves, fouls, and technical skill effectiveness. Data were examined using descriptive and comparative statistical analyses.

Results: Malaysia demonstrated greater dominance in ball possession, passing, and shooting opportunities in both finals. Nevertheless, Indonesia achieved higher scoring efficiency and stronger defensive performance. Shooting effectiveness increased from 57.69% in 2023 to 68.18% in 2025, while defensive indicators, including interceptions, attack blocks, and goalkeeper saves, consistently contributed to match success.

Conclusion: Indonesia's consecutive SEA Games titles were primarily associated with superior finishing efficiency, defensive stability, and effective utilization of scoring opportunities rather than possession dominance. These findings provide evidence-based insights for performance optimization and strategic development in elite indoor hockey.

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INTRODUCTION

Sport plays a significant role in promoting physical fitness, health, and human performance across different levels of participation. In competitive environments, athletic success is not achieved solely through talent but also through systematic preparation, structured training programs, and continuous performance evaluation (Hauser et al., 2024; Ihsan et al., 2024; Ribeiro et al., 2021; Zhao et al., 2024). The increasing competitiveness of modern sports has encouraged the integration of scientific approaches into coaching and athlete development. Among these approaches, performance analysis has emerged as an essential tool for understanding the factors that influence competitive outcomes. Performance analysis enables coaches and sport scientists to evaluate technical execution,

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tactical effectiveness, and overall team efficiency during competition (Colomer et al., 2020; Ferraz et al., 2023; Gomez-Ruano et al., 2020; Lord et al., 2020). The availability of detailed match statistics has further enhanced the ability to identify strengths and weaknesses in team performance. Through objective assessment, teams can make informed decisions regarding training priorities and strategic adjustments. As a result, performance analysis has become an indispensable component of evidence-based coaching practices. The application of analytical approaches has contributed to the improvement of athlete preparation and competitive performance in various sports. Therefore, understanding performance indicators is increasingly important for achieving success in elite-level competitions.

Indoor hockey is a fast-paced team sport that requires a combination of technical proficiency, tactical awareness, physical fitness, and coordinated teamwork. The game is characterized by rapid transitions between offensive and defensive phases, demanding quick decision-making and precise execution of technical skills. Players are required to perform a variety of actions, including passing, dribbling, ball control, shooting, tackling, and defensive positioning under dynamic competitive conditions (Coutinho et al., 2023; Freitas et al., 2026; Pizarro et al., 2021; Vencúrik et al., 2021). Success in indoor hockey is influenced not only by individual skill but also by collective team organization and strategic effectiveness. Teams must be capable of maintaining technical consistency while adapting to changing match situations. In recent years, advances in sport analytics have increased interest in examining the performance characteristics that contribute to successful outcomes in team sports. Match-related indicators such as shooting efficiency, passing effectiveness, ball possession, and defensive actions are commonly used to evaluate performance quality. These indicators provide valuable insights into how teams create scoring opportunities and prevent opponents from achieving success. Consequently, the systematic analysis of match performance has become an important method for understanding competitive achievement in indoor hockey. The growing relevance of performance analysis highlights the need for evidence-based evaluations of elite indoor hockey competitions.

The Indonesian Men's National Indoor Hockey Team has demonstrated substantial progress in regional competition during recent years. A significant milestone was achieved when the team secured the gold medal at the 2023 Southeast Asian Games in Phnom Penh, Cambodia (Creak & Trotier, 2024). The victory was particularly remarkable because Indonesia successfully overcame a three-goal deficit before ultimately winning the final match. This achievement marked one of the most important accomplishments in the history of Indonesian indoor hockey. The success was not an isolated event, as Indonesia repeated this achievement by winning another gold medal at the 2025 Southeast Asian Games in Thailand. In the second championship campaign, Indonesia once again defeated Malaysia, one of the strongest hockey nations in the region. Consecutive victories against the same opponent suggest the presence of consistent performance characteristics that contributed to sustained success. These accomplishments reflect the increasing competitiveness and development of Indonesian indoor hockey at the international level. They also provide an opportunity to examine the technical, tactical, and performance-related factors associated with championship achievement. Therefore, Indonesia's consecutive gold-medal campaigns represent a valuable case for investigating the determinants of success in elite indoor hockey competition.

Previous studies have established the importance of performance indicators, match analysis, and technical-tactical performance in explaining team success across various sports contexts. Research has shown that technical and tactical actions are critical determinants of competitive outcomes in volleyball and other team sports, while advances in performance analytics have enabled the identification of key factors influencing team effectiveness and match success (Clemente et al., 2021). Similarly, recent studies have increasingly employed match analysis and data-driven approaches to examine tactical behavior, physical demands, and performance indicators associated

with successful teams (Goes et al., 2021; Modric et al., 2022; Oliva-Lozano et al., 2022). However, the existing literature has predominantly focused on football, volleyball, and other major team sports, whereas research on indoor hockey remains relatively limited and largely concentrated on physiological characteristics, anthropometric profiles, and training interventions rather than competitive match-performance analysis. Furthermore, most studies have examined performance indicators from the perspective of winning versus losing teams or player development, with little attention given to the factors underlying sustained championship success in elite indoor hockey competitions. To date, no study has comprehensively compared the technical, tactical, and match-performance indicators of the Indonesian Men's National Indoor Hockey Team across two consecutive SEA Games gold-medal campaigns against the same opponent. Consequently, the performance characteristics associated with Indonesia's repeated international success remain insufficiently understood, highlighting the need for a comparative analysis of the indicators contributing to championship performance in elite indoor hockey.

This study aimed to compare the performance of the Indonesian Men's National Indoor Hockey Team in the finals of the 2023 and 2025 Southeast Asian Games against Malaysia through a comprehensive match-performance analysis. Specifically, the study sought to identify the offensive, defensive, and technical indicators associated with Indonesia's championship-winning performances. The analysis focused on match-related variables such as shooting effectiveness, passing performance, ball possession, defensive actions, and overall team efficiency. By comparing two consecutive championship campaigns, the study intended to determine whether similar performance patterns contributed to both victories. The investigation also aimed to identify performance characteristics that distinguished successful outcomes from general match dominance. Furthermore, the study sought to provide a deeper understanding of how technical and tactical effectiveness contributed to Indonesia's ability to maintain competitive superiority. The findings are expected to contribute to the growing body of knowledge on performance analysis in indoor hockey. They may also provide practical insights for coaches, athletes, and performance analysts in designing evidence-based training programs. In addition, the results can support the development of more effective tactical strategies for future international competitions. Ultimately, this study aims to enhance understanding of the performance indicators associated with sustained championship success in elite indoor hockey.

LITERATURE REVIEW

Performance analysis has become one of the most important approaches in contemporary sport science for evaluating athlete and team performance. The development of analytical methods has enabled researchers and coaches to obtain objective information regarding the factors that influence competitive outcomes. Performance analysis involves the systematic observation, recording, and interpretation of events that occur during training sessions and competitive matches (Colomer et al., 2020; Lord et al., 2020; Martin et al., 2021). Through this approach, performance can be assessed using quantitative indicators that reflect the effectiveness of technical, tactical, physical, and psychological components. The increasing availability of statistical and video-based data has expanded opportunities for detailed evaluation of team behavior during competition. Performance analysis is widely used to identify strengths and weaknesses, monitor progress, and support strategic decision-making. In elite sports, the ability to transform match data into actionable insights is considered a competitive advantage. The application of performance analysis has therefore become an integral component of athlete preparation and competition management. Furthermore, analytical approaches provide evidence-based information that can improve training efficiency and

competitive performance. Consequently, performance analysis serves as a fundamental framework for understanding the determinants of success in modern team sports.

Performance indicators are measurable variables that represent specific aspects of individual or team performance during competition. These indicators are commonly used to evaluate effectiveness and efficiency in achieving desired outcomes. In team sports, performance indicators often include measures related to ball possession, passing accuracy, shooting success, defensive actions, and overall tactical execution (Liu et al., 2021; Lord et al., 2020; Plakias et al., 2024; Stafylidis et al., 2024; Wang et al., 2022). Such indicators provide valuable information about how teams create scoring opportunities and manage defensive responsibilities. The interpretation of performance indicators allows coaches and analysts to identify the characteristics associated with successful performances. Previous studies have demonstrated that performance indicators can distinguish between successful and unsuccessful teams across different competitive contexts (Devasahay et al., 2021; Drikos et al., 2021). However, the relative importance of individual indicators may vary according to the characteristics of the sport and competition level. Therefore, understanding the interaction among multiple performance indicators is essential for explaining match outcomes. The use of performance indicators has become increasingly important in evidence-based coaching and athlete development. As a result, these indicators are frequently employed to evaluate competitive effectiveness in elite sports environments.

Technical and tactical performance represents a central component of success in team sports. Technical performance refers to the execution of sport-specific skills, whereas tactical performance involves the strategic application of those skills within competitive situations (Clemente et al., 2021; Farley et al., 2020). Effective technical execution enables athletes to perform actions accurately and efficiently under varying levels of pressure. At the same time, tactical competence allows teams to adapt their strategies according to match circumstances and opponent behavior (Cláudio Machado et al., 2020; Petiot et al., 2020; Plakias et al., 2024). In high-level competition, technical and tactical effectiveness are often closely interconnected and contribute collectively to successful outcomes (Huang et al., 2025; Santos et al., 2025). Teams that demonstrate superior technical consistency are generally better positioned to implement tactical plans effectively. Likewise, tactical adaptability can enhance the utilization of technical skills in critical match situations. Advances in sport analytics have facilitated the assessment of technical and tactical performance through objective match statistics and observational methods. This approach has improved understanding of the mechanisms underlying successful team performance. Consequently, technical and tactical analysis has become a key area of investigation in performance-related sport science research.

Match statistics provide a practical means of evaluating performance characteristics associated with competitive success. Variables such as shots, shots on target, goals scored, passing effectiveness, interceptions, defensive actions, and possession rates are commonly used to assess team performance (Cao, 2024; Rocha-Lima et al., 2021; Wang et al., 2022). These statistics allow researchers to quantify both offensive and defensive contributions during competition. In many team sports, successful teams are characterized by efficient use of scoring opportunities rather than simple dominance in possession or overall activity (Lamas et al., 2020; Lord et al., 2020). This observation suggests that performance quality may be more important than performance quantity in determining competitive outcomes. Furthermore, match statistics can reveal patterns of play that are not immediately observable during competition. The integration of multiple statistical indicators provides a more comprehensive understanding of team effectiveness. Comparative analysis of match statistics is therefore useful for identifying factors associated with winning performances. Such analyses also assist coaches in developing targeted interventions to improve specific aspects of team performance. Consequently, match statistics remain one of the most valuable sources of information in performance evaluation and strategic planning.

Indoor hockey presents unique performance demands that distinguish it from many other team sports. The game is played in a confined space and requires rapid transitions between attacking and defensive phases. As a result, players must demonstrate high levels of technical proficiency, tactical awareness, and decision-making speed. Success in indoor hockey depends on the ability to execute skills effectively under conditions of constant pressure and limited time. Technical actions such as passing, dribbling, ball control, and shooting play a critical role in creating scoring opportunities (Cao, 2024; Pizarro et al., 2021; Vencúrik et al., 2021). Similarly, defensive actions including interceptions, blocking, and goalkeeping contribute substantially to competitive success. Despite the growing popularity of indoor hockey, research examining match-performance indicators in elite competitions remains relatively limited. Existing studies have often focused on physical characteristics and training-related variables rather than detailed match-performance analysis. Consequently, there is a need for further investigation into the performance indicators associated with successful outcomes in international indoor hockey tournaments. Understanding these indicators can provide valuable insights for coaches, athletes, and sport organizations seeking to enhance competitive performance.

METHOD

Research Design

This study employed a quantitative descriptive research design using a comparative match-performance analysis approach. The research was designed to examine and compare the performance indicators of the Indonesian Men's National Indoor Hockey Team during the final matches of the 2023 and 2025 Southeast Asian Games against Malaysia. A match-performance analysis approach was selected because it provides a systematic framework for evaluating technical, tactical, and statistical aspects of team performance in competitive environments. The study focused on identifying patterns of offensive effectiveness, defensive stability, technical execution, and overall match efficiency associated with championship success. Through a comparative analysis of two consecutive gold-medal campaigns, the research aimed to determine the performance characteristics that contributed to Indonesia's repeated success at the regional level. The design enabled the researchers to investigate similarities and differences in match statistics across the two competitions while maintaining an objective and data-driven perspective. The analysis was conducted at the team level rather than the individual player level. Performance indicators were derived from official match statistics and verified through video-based observations. This design is widely applied in sport-performance research to evaluate competitive outcomes and identify determinants of success. Therefore, the selected research design was considered appropriate for achieving the objectives of the study.

Participant

The participants in this study were the Indonesian Men's National Indoor Hockey Team and the Malaysian Men's National Indoor Hockey Team that competed in the finals of the 2023 and 2025 Southeast Asian Games. The units of analysis consisted of team-level performance indicators generated during the two final matches. These matches represented elite-level international competitions involving the two most successful indoor hockey teams in Southeast Asia. The 2023 final was held in Phnom Penh, Cambodia, while the 2025 final took place in Thailand. Both matches were selected because they involved the same opponent and represented consecutive championship-winning performances by Indonesia. The population of the study included all match-performance data generated during the men's indoor hockey competitions at the 2023 and 2025 Southeast Asian Games. The sampling technique employed was total sampling, whereby all available statistical data from the final matches were included in the analysis. This approach ensured that all relevant

information related to the research objectives was comprehensively examined. By utilizing the entire dataset from both finals, the study minimized sampling bias and enhanced the completeness of the analysis. Consequently, the selected participants and sampling procedure provided a reliable basis for evaluating performance characteristics associated with Indonesia's consecutive gold-medal achievements.

Instrument

Data were collected using a structured match-analysis instrument specifically developed to record and classify performance indicators commonly employed in hockey performance analysis. The instrument was designed based on established performance-analysis frameworks and incorporated variables frequently used in elite hockey research. Offensive indicators included total shots, shots on target, goals scored, and shooting effectiveness. Defensive indicators consisted of interceptions, attack blocks, goalkeeper saves, goals conceded, and fouls committed. Technical indicators included successful passes, ball possession, passing effectiveness, dribbling effectiveness, and ball-control effectiveness. The scoring procedure involved recording the frequency of each performance indicator and calculating corresponding percentages to facilitate comparison between teams and competitions. Data were obtained from official match reports released by the Southeast Asian Games organizing committee and were subsequently verified through video recordings of both final matches. The use of multiple data sources enhanced the credibility and accuracy of the recorded information. All match events related to the selected indicators were systematically documented using the match-analysis sheet. The completed datasets were then organized into comparative tables for further analysis and interpretation.

Research Procedure

The research procedure consisted of several sequential stages. First, official statistical reports and video recordings from the 2023 and 2025 Southeast Asian Games finals were collected from authorized sources. Second, all performance indicators relevant to the objectives of the study were identified and operationally defined. Third, the recorded matches were systematically reviewed to verify the accuracy of the official statistics and to obtain additional observational data when necessary. Fourth, all performance indicators were entered into the structured match-analysis instrument and organized into comparative datasets. Fifth, the collected data were checked for completeness, consistency, and accuracy before statistical analysis was conducted. Sixth, descriptive and comparative statistical analyses were performed to evaluate offensive, defensive, and technical performance indicators. Seventh, the results were presented in tabular and graphical forms to facilitate interpretation. Finally, the findings were interpreted in relation to the study objectives to identify the performance characteristics associated with Indonesia's consecutive gold-medal victories. The entire procedure was designed to ensure methodological rigor, data accuracy, and consistency throughout the research process. Through these stages, the study generated a comprehensive evaluation of performance indicators associated with success in elite indoor hockey competition.



Figure 1. Research Method Flow

Data Analysis

The collected data were analyzed using descriptive and comparative statistical techniques. Frequencies and percentages were calculated for each performance indicator to describe team performance and identify differences between Indonesia and Malaysia. Comparative analyses were conducted both within individual matches and across the two championship campaigns. The percentage of each indicator was calculated using the formula $P = (F/N) \times 100$, where P represents the percentage, F represents the frequency of occurrence, and N represents the total number of observations. In addition, effectiveness rates were calculated for selected technical indicators, including passing, dribbling, ball control, and shooting performance. The analysis focused on identifying indicators associated with offensive effectiveness, defensive stability, and technical efficiency. Descriptive statistical results were presented through tables and graphical visualizations to facilitate interpretation and comparison. The findings were subsequently interpreted to identify recurring performance patterns associated with Indonesia's success in both tournaments. Particular attention was given to variables that consistently differentiated successful performance from general match dominance. Through this approach, the study sought to provide a comprehensive understanding of the performance indicators associated with championship achievement in elite indoor hockey.

RESULTS AND DISCUSSION

Results

The analysis of the final matches between Indonesia and Malaysia at the 2023 and 2025 SEA Games revealed differences in offensive and defensive performance indicators. Malaysia demonstrated greater dominance in ball possession, successful passes, and overall game control during both matches. However, Indonesia showed superior effectiveness in converting scoring opportunities and maintaining defensive stability.

Table 1. Match Statistics of Indonesia vs Malaysia in the 2023 SEA Games Final.

No	Variabel	Indonesia	Malaysia	Persentase Indonesia (%)	Persentase Malaysia (%)
1	Total Shots	26	45	36,62	63,38
2	Shots on Target	15	22	40,54	59,46
3	Goals Scored	5	3	62,50	37,50
4	Successful Passes	168	250	40,19	59,81
5	Ball possession	43	57	43	57
6	Interceptions	83	78	51,55	48,45
7	Attack Blocks	12	9	57,14	42,86
8	Goals Conceded	4	5	44,44	55,56
9	Goalkeeper Saves	15	10	60,00	40,00
10	Fouls	25	30	45,45	54,55

Table 1 shows that Malaysia dominated the match in terms of total shots (45), shots on target (22), successful passes (250), and ball possession (57%). However, Indonesia was more effective in converting opportunities into goals, scoring five goals compared to Malaysia's three goals. Defensively, Indonesia performed better by recording more interceptions (83), attack blocks (12), and goalkeeper saves (15). These defensive strengths helped Indonesia withstand Malaysia's attacking pressure and maintain its advantage. Overall, although Malaysia controlled more of the game, Indonesia achieved victory through greater attacking efficiency, solid defensive organization, and effective utilization of scoring opportunities. This finding indicates that match success is determined not only by possession dominance but also by the effectiveness of offensive and defensive performance.

Table 2. Match Statistics of Indonesia vs Malaysia in the 2025 SEA Games Final.

No	Variabel	Indonesia	Malaysia	Persentase Indonesia (%)	Persentase Malaysia (%)
1	Total Shots	48	52	45	52,00
2	Shots on Target	22	30	36	57,69
3	Goals Scored	6	4	60	40,00
4	Successful Passes	189	228	69	54,68
5	Ball possession	48	52	48	52,00
6	Interceptions	90	97	51	51,87
7	Attack Blocks	8	7	22	46,67
8	Goals Conceded	4	6	27	60,00
9	Goalkeeper Saves	12	10	28	45,45
10	Fouls	33	27	32	45,00

Indonesia demonstrated greater efficiency in converting chances into goals, scoring six goals compared to Malaysia's four goals. This finding suggests that Indonesia was more effective in finishing attacking opportunities despite having less possession. From a defensive perspective, Indonesia showed strong performance through effective attack blocks (8) and goalkeeper saves (12),

which helped reduce Malaysia's scoring opportunities. Although Malaysia recorded more interceptions (97), Indonesia maintained better defensive discipline and successfully prevented the opponent from capitalizing on its possession advantage. Overall, the statistics indicate that while Malaysia controlled possession and passing, Indonesia achieved victory through superior finishing efficiency, effective defensive organization, and the ability to capitalize on crucial opportunities. These findings reinforce the notion that success in indoor hockey is determined not only by possession dominance but also by attacking effectiveness and defensive stability

Basic Technical Skills of the Indonesian National Team at the 2023 SEA Games

Table 3. Effectiveness of Basic Technical Skills of the Indonesian National Team at the 2023 SEA Games

No	Indikator	Success	Fail	Persentase Efektivitas (%)
1	Passing	168	48	77,80
2	Dribbling	36	24	60,40
3	Ball Control	156	89	63,74
4	Shooting	15	11	57,69

Basic Technical Skills of the Indonesian National Team at the 2025 SEA Games

Table 4. Effectiveness of Basic Technical Skills of the Indonesian National Team at the 2025 SEA Games

No	Indikator	Success	Fail	Persentase Efektivitas (%)
1	Passing	189	64	74,70
2	Dribbling	29	19	60,42
3	Ball Control	179	90	60,54
4	Shooting	22	26	68,18

Indonesia won the 2023 final after recovering from a three-goal deficit and eventually securing victory through a penalty shootout. In the 2025 final, Indonesia successfully defended its gold medal by demonstrating effective attacking strategies and disciplined defensive organization. The match statistics showed that Indonesia was more efficient in goal scoring despite having lower possession and fewer attacking opportunities.

Comparison of the Effectiveness of the Indonesian National Team's Basic Techniques

The effectiveness of basic techniques in the 2023 SEA Games and 2025 SEA Games finals. The analysis of basic technical skills revealed that passing remained the most effective technical element in both tournaments, reaching 77.8% effectiveness in 2023 and 74.7% in 2025. Dribbling effectiveness remained relatively stable at approximately 60%, while ball-control effectiveness slightly decreased from 63.74% to 60.54%. The most significant improvement was observed in shooting effectiveness, which increased from 57.69% in 2023 to 68.18% in 2025. This improvement indicates a greater ability to convert scoring opportunities into goals. Furthermore, Indonesia recorded strong defensive indicators through interceptions, attack blocks, and goalkeeper saves, which contributed significantly to match success.

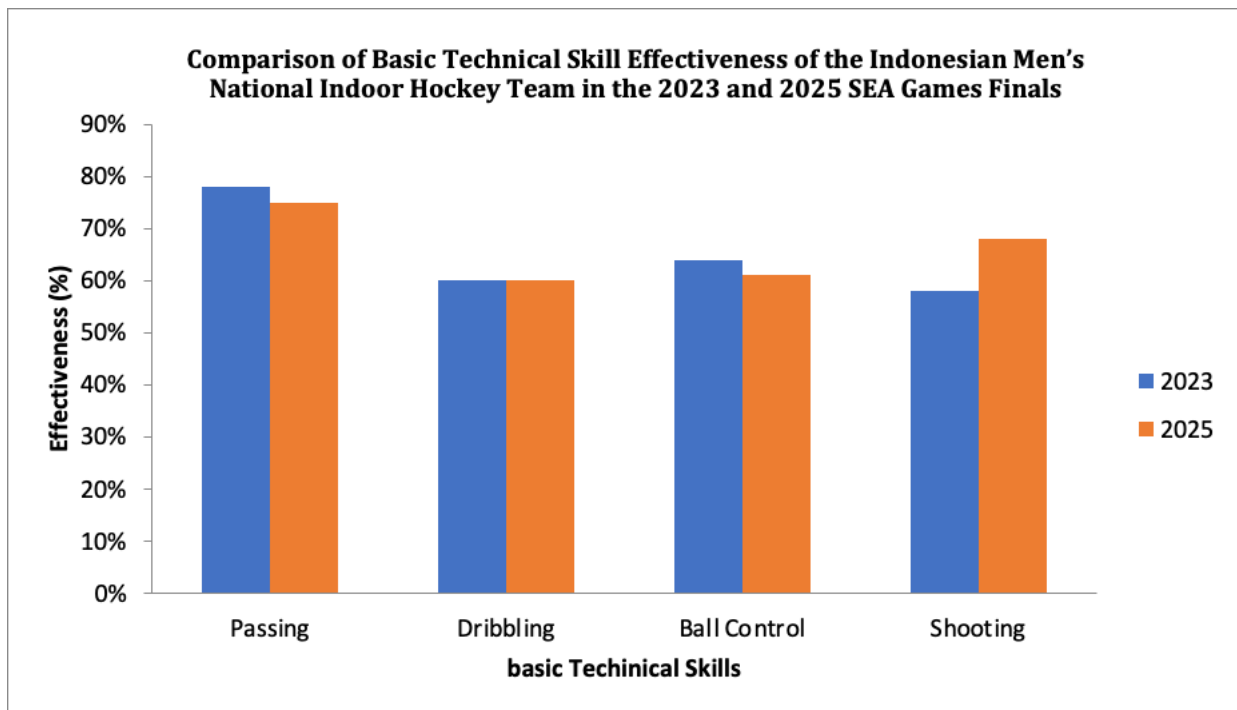


Figure 2. Comparison of the Effectiveness of Basic Technical Skills of the Indonesian Men's National Indoor Hockey Team in the 2023 and 2025 SEA Games Finals.

The figure illustrates the effectiveness percentages of four fundamental technical skills, namely passing, dribbling, ball control, and shooting, during the SEA Games finals in 2023 and 2025. Passing demonstrated the highest effectiveness in both tournaments, while shooting showed the most substantial improvement, increasing from 57.69% in 2023 to 68.18% in 2025. In contrast, dribbling and ball-control effectiveness remained relatively stable across both competitions. The findings indicate an improvement in Indonesia's offensive efficiency, particularly in converting scoring opportunities into successful outcomes during the 2025 championship campaign.

Discussion

The findings of this study demonstrate that Indonesia's consecutive gold-medal achievements at the 2023 and 2025 SEA Games were not solely determined by dominance in conventional match statistics but rather by the effective integration of tactical, technical, physical, and psychological factors. Although Malaysia consistently recorded higher ball-possession percentages and greater passing volumes, Indonesia exhibited superior efficiency in converting scoring opportunities into goals and maintaining defensive stability. This finding reinforces the view that success in team sports cannot be explained by a single performance variable. Instead, competitive outcomes emerge from the interaction of multiple performance dimensions operating simultaneously throughout a match. Similar observations have been reported in previous performance-analysis studies, which found that successful teams often prioritize effectiveness over volume-based indicators (Gama et al., 2026; Sitti & Rangubhet, 2025; Stafylidis et al., 2024). The present findings suggest that possession dominance alone is insufficient to guarantee victory when not accompanied by efficient decision-making and execution. Indonesia's ability to capitalize on critical moments during both finals highlights the importance of tactical effectiveness in elite competition. This result also supports contemporary perspectives in sport analytics emphasizing outcome-oriented performance indicators rather than activity-oriented indicators. The findings therefore contribute to the growing understanding that successful performance is multidimensional and context dependent. Consequently, the present study provides additional evidence that efficiency-

based indicators may be more informative than possession-related statistics when evaluating championship performance.

From a tactical perspective, Indonesia's success appears to have been strongly influenced by its ability to adapt to changing match situations. The dramatic comeback from a three-goal deficit during the 2023 SEA Games final provides clear evidence of tactical flexibility and strategic responsiveness under pressure. Teams competing at elite levels are frequently required to modify tactical structures according to match circumstances, opponent behavior, and score-line conditions. Indonesia's performance suggests a high level of tactical maturity, allowing players to maintain effectiveness despite unfavorable situations. Previous research has indicated that successful teams often demonstrate superior situational awareness and adaptability compared with less successful opponents (Ashford et al., 2021; Kamarunzaman et al., 2025; Schei & Giske, 2020; Weller et al., 2024). The current findings align with these observations by showing that Indonesia maintained competitive effectiveness even when statistical indicators appeared to favor Malaysia. Tactical adaptability may have enabled the team to exploit critical opportunities while minimizing exposure to defensive vulnerabilities. Furthermore, the ability to adjust attacking and defensive strategies during the match likely contributed to the efficient use of available scoring opportunities. Such findings reinforce the importance of tactical preparation and match intelligence in determining competitive outcomes. Therefore, tactical flexibility should be regarded as a key component of successful performance in elite indoor hockey competitions.

The physical characteristics of the Indonesian players also appear to have contributed substantially to their success across both tournaments. Maintaining a high level of performance throughout demanding championship matches requires adequate aerobic capacity, repeated-sprint ability, and recovery efficiency. Indoor hockey is characterized by frequent transitions, high-intensity movements, and repeated technical actions performed under fatigue conditions. Consequently, physical fitness serves as a foundation that supports tactical and technical execution during competition. The consistent performance observed in both SEA Games finals suggests that Indonesian players possessed sufficient physiological capacity to sustain performance quality throughout the matches. Previous investigations have emphasized the importance of aerobic endurance and repeated-sprint performance in high-intensity team sports (Gupta et al., 2025; Wei et al., 2025; Yuan et al., 2024). The current findings support this perspective by indicating that physical readiness may have facilitated the execution of tactical plans and technical skills under competitive pressure. In addition, effective physical conditioning may have enhanced players' ability to maintain concentration and decision-making accuracy during critical moments. The findings further suggest that physical preparation contributes indirectly to match success by supporting technical and tactical performance. Therefore, the role of physical conditioning should not be viewed in isolation but as an integral component of overall competitive effectiveness.

Another important explanation for Indonesia's success lies in the effectiveness of its training and athlete-development systems. The consistent achievement of gold medals across two consecutive SEA Games indicates that the observed performances were unlikely to be the result of isolated circumstances. Rather, the findings suggest the presence of a structured preparation process capable of producing sustainable competitive outcomes. Systematic training programs are designed to progressively develop technical skills, tactical understanding, physical capacities, and psychological readiness (Lokyan et al., 2025; Tornero-Aguilera et al., 2024). The observed improvements in performance effectiveness between the two championship campaigns may reflect the cumulative impact of long-term training adaptations. Previous studies on periodized training have reported that structured preparation programs contribute significantly to peak performance during major competitions. The current findings are consistent with these perspectives and indicate that Indonesia's success may be associated with effective planning and performance management.

Furthermore, athlete-development frameworks emphasize the importance of continuity and progression throughout an athlete's career. The ability to maintain competitive success across multiple tournaments suggests that Indonesia's development system may be functioning effectively at both individual and team levels. Consequently, sustainable athlete development should be recognized as a critical factor underlying repeated success in international indoor hockey.

Psychological resilience emerged as another important factor contributing to Indonesia's championship performances. The ability to recover from adverse situations and perform effectively during high-pressure moments reflects strong mental preparedness. Elite-level competition frequently exposes athletes to emotional stress, uncertainty, and performance pressure that can influence decision-making and technical execution. Indonesia's successful comeback in 2023 and ability to defend its title in 2025 suggest high levels of confidence, emotional control, and collective resilience. Previous research has consistently identified psychological factors as important determinants of performance in elite sport. Mental attributes such as confidence, motivation, concentration, and stress management are often associated with successful competitive outcomes. The current findings support this perspective by indicating that psychological readiness may have enabled Indonesian players to maintain composure during decisive moments. Moreover, the interaction between psychological strength and tactical effectiveness likely contributed to the team's ability to execute strategic decisions under pressure. These observations suggest that psychological preparation should be integrated alongside physical, technical, and tactical training within elite-performance programs. Overall, the present study highlights that sustained championship success in indoor hockey is best understood as the product of interconnected physical, technical, tactical, psychological, and developmental factors rather than any single performance indicator.

Implications

The findings of this study have important theoretical and practical implications for the development of elite indoor hockey performance. From a practical perspective, the results demonstrate that competitive success is not necessarily determined by dominance in ball possession or passing volume, but rather by the effective conversion of scoring opportunities and the maintenance of defensive stability. This suggests that coaches should place greater emphasis on improving shooting efficiency, defensive coordination, and decision-making during critical match situations. Training programs should therefore be designed to enhance both offensive effectiveness and defensive resilience under competitive pressure. The findings also highlight the importance of tactical adaptability, as successful teams must be capable of adjusting their strategies in response to changing match dynamics and opponent behavior. From a physical preparation standpoint, the results reinforce the need for conditioning programs that support repeated high-intensity actions and sustained performance throughout the match. Furthermore, the observed consistency of Indonesia's championship performances suggests that long-term athlete development and systematic training processes play a crucial role in achieving sustained success. For sport organizations and national federations, the study provides evidence that investment in structured athlete development pathways may contribute to long-term international competitiveness. Theoretically, this research extends the literature on performance analysis by demonstrating that championship success in indoor hockey is influenced by the interaction of technical, tactical, physical, and psychological factors rather than a single performance indicator. The findings also contribute to the growing body of evidence supporting efficiency-based performance indicators as more meaningful predictors of success than possession-related statistics alone. In addition, the study offers a contextual contribution to the limited literature on elite indoor hockey performance in Southeast Asia, an area that remains underrepresented in sport-performance research. Overall, the results provide an evidence-based framework that can assist coaches, analysts, and sport administrators in

developing strategies aimed at optimizing performance and sustaining competitive success at the international level.

Limitations and Suggestions for Future Research

This study has several limitations that should be considered when interpreting the findings. First, the analysis was restricted to two final matches of the 2023 and 2025 SEA Games, which limits the generalizability of the results to other competitions, teams, and performance contexts. Second, the study relied primarily on official match statistics and video observations, which, although useful for performance evaluation, may not fully capture the complexity of tactical decision-making and player interactions during competition. Third, the analysis focused on team-level performance indicators and did not examine individual player contributions, positional differences, or role-specific performance characteristics that may have influenced match outcomes. Fourth, the study employed descriptive and comparative statistical approaches, which provide valuable insights into performance patterns but do not allow for causal inferences regarding the determinants of success. In addition, contextual factors such as opponent strategy, match momentum, coaching decisions, and situational pressures were not quantitatively assessed. The absence of physiological and biomechanical data also limits the ability to explain how physical performance contributed to the observed outcomes. Furthermore, psychological variables such as confidence, resilience, and decision-making under pressure were inferred from performance outcomes rather than directly measured. Future studies should include a larger sample of matches from multiple tournaments and competitive levels to improve the generalizability of findings. Researchers are also encouraged to integrate advanced performance analytics, including notational analysis, network analysis, and predictive modeling, to provide a deeper understanding of competitive performance. The inclusion of physiological, psychological, and tactical variables would offer a more comprehensive perspective on the factors associated with success in elite indoor hockey. Future investigations should further explore positional performance profiles and longitudinal athlete-development pathways to identify indicators associated with sustained international achievement. Such approaches would contribute to a more holistic understanding of championship performance and support the development of evidence-based strategies for long-term success in indoor hockey.

CONCLUSION

This study compared the performance of the Indonesian Men's National Indoor Hockey Team in the 2023 and 2025 SEA Games finals against Malaysia using match statistics and technical skill effectiveness analysis. The results revealed that Malaysia consistently dominated ball possession, successful passes, and overall game control in both matches. However, Indonesia demonstrated greater efficiency in converting scoring opportunities into goals and maintaining strong defensive performance. The findings showed that Indonesia's success was primarily influenced by attacking efficiency, defensive discipline, and the ability to capitalize on crucial opportunities rather than by possession dominance. In both tournaments, passing was identified as the most effective technical skill, while shooting effectiveness showed a significant improvement from 57.69% in 2023 to 68.18% in 2025. This improvement contributed substantially to Indonesia's ability to score goals and secure victories. Furthermore, Indonesia's achievements in winning the 2023 SEA Games gold medal and successfully defending the title in 2025 reflect effective tactical adaptation, strong physical preparation, psychological resilience, and a well-structured athlete development system. Therefore, the success of the Indonesian Men's National Indoor Hockey Team can be attributed to the integration of technical effectiveness, tactical efficiency, defensive stability, and the ability to perform effectively under competitive pressure. These findings highlight the importance of performance

analysis as a tool for evaluating team strengths and weaknesses and provide valuable information for coaches and sports organizations in developing evidence-based training programs to enhance future international performance

AUTHOR CONTRIBUTIONS STATEMENT

Tri Pujiyanto conceptualized the study, designed the research methodology, conducted data collection and match-performance analysis, interpreted the findings, and prepared the original manuscript draft. Masrun contributed to the development of the research framework, supervised the analytical procedures, and provided critical revisions to the manuscript. Ardo Okilanda participated in data verification, statistical analysis, interpretation of performance indicators, and manuscript editing. Yendrizal contributed to the validation of match-performance data, assisted in the interpretation of results, and reviewed the manuscript for intellectual content. Roma Irawan supervised the overall research process, provided methodological guidance, contributed to the discussion and conclusion sections, and critically revised the manuscript prior to submission. All authors contributed substantially to the study, reviewed and approved the final version of the manuscript, and agreed to be accountable for all aspects of the work, ensuring the accuracy and integrity of the research.

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