Journal Sport Area
http://journal.uir.ac.id/index.php/JSP
Vol. 11. No. 2. August, (2026)

Technical actions associated with point outcomes: A notational analysis of Anthony Sinisuka Ginting at the 2018 China Open

Wahyu Eko Widiyanto[1abcde,*], Rizki Apriliyanto[1abc], & Jamaludin Yusuf[2bcd]

Universitas Muhammadiyah Jember, Indonesia[1]
Universitas Muhammadiyah Pekajangan Pekalongan, Indonesia[2]

Received 28 August 2025; Accepted 19 August 2026; Published 31 August 2026
Ed 2026; *11*(2): 294-304

ABSTRACT

Background: Match statistics provide objective information for evaluating badminton performance and developing evidence-based coaching strategies. However, limited studies have comprehensively examined the technical actions contributing to an elite player's performance throughout an entire tournament. **Objectives:** This study aimed to analyse the effectiveness of technical actions performed by Anthony Sinisuka Ginting during the VICTOR China Open 2018 HSBC BWF World Tour Super 1000, focusing on point-winning and point-losing outcomes. **Methods:** This study employed a quantitative observational design using systematic notational analysis. Performance data were obtained from official Badminton World Federation (BWF) match videos covering all four matches played by Anthony Sinisuka Ginting from the Round of 16 to the final, comprising 10 sets with a mean set duration of 26.1 minutes. Each match was systematically coded using a structured observation instrument to record service, netting, smash, drive, dropshot, lob, chop, defend, and lift actions. Technical actions were classified according to successful and unsuccessful outcomes, and the data were analysed descriptively using frequencies and percentages. **Results:** The smash generated the highest number of points, with an average success rate of 57.0% and an unforced error rate of 14.6%. In contrast, netting showed the highest proportion of successful actions but also the highest unforced error rate (26.7%). This pattern indicates that netting involved a greater balance between successful and unsuccessful outcomes than the other technical actions analysed. **Conclusions:** The findings demonstrate that technical performance in elite badminton is characterised by differences in point production and error patterns across technical actions. The results provide an athlete-centred perspective on elite badminton performance and offer practical evidence for coaches when evaluating match performance and designing technical and tactical training programmes.

Keywords: Badminton; performance analysis; technical actions; notational analysis; point outcomes

https://doi.org/10.25299/sportarea.2026.vol11(2).24760

Wahyu Eko Widiyanto, Department of Physical Education, Faculty of Teacher Training and Education, Universitas Muhammadiyah Jember, Jember, Indonesia
wahyu.ew@unmuhjember.ac.id

How to Cite: Widiyanto, W. E., Apriliyanto, R., & Yusuf, J. (2026). Technical actions associated with point outcomes: A notational analysis of Anthony Sinisuka Ginting at the 2018 China Open. *Journal Sport Area*, *11*(2), 294-304. https://doi.org/10.25299/sportarea.2026.vol11(2).24760

Authors' Contribution: a – Study Design; b – Data Collection; c – Statistical Analysis; d – Manuscript Preparation; e – Funds Collection

INTRODUCTION

Indonesia has long been known as one of the world's badminton powerhouses, with its athletes consistently making achievements in various international events. The global governing organisation for the sport is the Badminton World Federation (BWF). Of the many players, Anthony Sinisuka Ginting is one of the figures who stand out thanks to his achievements at the world level. Despite having a posture that is not classified as high compared to a number of other players, Ginting proved that performance in badminton is not only determined by physical factors alone. Components of physical condition, such as speed, strength, and muscle endurance, proved to be the main support in achieving optimal performance (Karatnyka et al., 2021). In addition to the physical aspect, good cognitive abilities are also needed to execute complex actions in the game so as to produce maximum performance (Liao et al., 2017). Thus, Ginting shows that speed, accuracy, and ingenuity in strategy are important foundations of success. Furthermore, the arm position plays a significant role in optimising the speed of the smash hit (Ramasamy et al., 2024).

One of the factors that makes Anthony Sinisuka Ginting stand out is the variety in his playing patterns. He not only relies on hard punches but is also able to outwit opponents through sharp drop shots and blows with high accuracy that are difficult to anticipate. Other technical abilities, such as the lob offensive forehand and lob dropshot forehand, also have the potential to earn points. The results of previous studies have even shown that the forehand smash is the technique that gives the most points compared to other types of blows (Limatahu et al., 2020). In addition, Ginting is known for his ability to maintain a fast tempo of the game, which forces opponents to constantly move and react immediately. High-tempo game patterns have been shown to be effective in providing pressure as well as a competitive advantage (Zhang & Leng, 2024).

Another technical advantage is seen in the extremely lethal overhead smash hit. Speed and precision in execution often make it difficult for opponents, even those who have a high-quality game (Widiyanto et al., 2025). These skills are the result of a continuous training process, as research shows that long-term training can significantly improve the quality of overhead smash blows (Li et al., 2023). In addition to the technical aspects of the punch, agile foot movements are also characteristic of the game of Ginting. The agility of the movement is inseparable from the strength of the leg muscles that serve as the main support (Savla et al., 2020). In badminton, foot agility is a basic requirement because this sport belongs to the category of games with high intensity (Abián-Vicén, 2018; Arnando et al., 2024; Guilherme et al., 2018). Therefore, physical exercise programmes need to focus on elements of endurance, agility, and strength (power), considering these components to be important parameters in supporting achievement, in addition to other aspects of physical condition. Furthermore, improving the quality of physical condition has been shown to affect the performance of athletes, where cardiovascular endurance, for example, can provide a positive stimulus to the performance of badminton players (Stovba et al., 2020; Widiyanto et al., 2025).

In the context of badminton performance, technical ability and physical condition alone are not enough to describe an athlete's overall performance. A more comprehensive evaluation can be obtained through match analysis. Studies related to the analysis of badminton games have recently become a concern in contemporary research (Simón-Chico et al., 2023). Such analysis allows the identification of both strengths and weaknesses of athletes based on objective data obtained from video recordings of matches (Lin et al., 2023). Video recording serves as a visual tool that helps coaches and players evaluate performance in more detail. In addition, match data can also be used to design exercise programmes, both in terms of intensity and volume (Liao et al., 2017).

Although badminton match analysis has been widely studied, most previous research has focused on performance metrics, physiological reactions, technical ability, and the difference between winning and losing players (Sheng et al., 2025; Zhao et al., 2025). Notational analysis has also been used to describe rally features, stroke usage, and movement patterns during games. Although these studies have helped broaden our understanding of badminton performance, they have rarely looked at how points are built through a series of technical actions performed by individual players in a given tournament. In addition, many investigations of elite players rely on data from various competitions, which limits the ability to understand the unique technical qualities that lead to success in a particular tournament. As a result, there is limited evidence of technical patterns associated with high levels of competitive success.

In general, match analysis aims to make in-depth observations of an athlete's ability to carry out specific activities. In badminton, this includes the assessment of movement patterns and stroke skills that can be observed through replays. The effectiveness of the attack can be referenced by feather leg trainers. Thus, analysis has an important role as a monitoring tool as well as in assessing player performance. Its significance lies in providing information related to the quality and performance of athletes obtained from direct observation of the games (Roure & Dieu, 2023). Aside from being the basis for assessing performance levels, analysis can also be used as an anticipatory strategy in the game. The utilisation of match recordings allows the discovery of facts related to the performance of athletes that can be identified through the evaluation process (Liu et al., 2023). Ultimately, match analysis helps to understand playing behaviour, which is often the key to victory in badminton (Chen et al., 2023).

One tournament that provides useful insight into this field is the VICTOR China Open 2018 HSBC BWF World Tour Super 1000. In this event, Anthony Sinisuka Ginting gave an outstanding performance by defeating several opponents ranked higher than him, including the round of thirty-two against Lin Dan, ranked twelfth; the top sixteen against Viktor Axelsen, ranked third; the top eight, Chen Long, ranked sixth; the semifinals, Chou Tien Chen, ranked fifth; and the final match against world number one, Kento Momota. Finally, Ginting won the tournament, which was only ranked ninth in the world. Despite the importance of this achievement, there is still little research examining how Ginting earned points and used various technical actions throughout the tournament. A detailed look at his performance can offer a better understanding of the technical factors that helped him succeed against top-tier competitors.

Therefore, this study aimed to analyse Anthony Sinisuka Ginting's performance during the VICTOR China Open 2018 HSBC BWF World Tour Super 1000, focusing on how he earned points and the various techniques he used throughout the tournament. The analysis was conducted using video footage of the match to identify how points were distributed and technical patterns that emerged during the match. The results are expected to contribute to the field of badminton performance analysis and offer practical guidance for coaches, players, and sports scientists in creating effective training and competition strategies at the elite level.

METHODS

Type of Research

This study used a quantitative observational research approach, specifically systematic notational analysis, to assess the technical performance of Anthony Sinisuka Ginting during the VICTOR China Open 2018 HSBC BWF World Tour Super 1000. Observational methods were chosen because they allow for an objective and systematic study of athletes' behaviours in real competitive situations without altering the environment of the competition. The research aimed to identify point-scoring trends and the frequency of technical actions throughout the tournament, using official match footage from BWF TV as a data source.

Participant

The individual involved in this study was Anthony Sinisuka Ginting, an Indonesian elite male badminton player who participated in the men's singles event at the VICTOR China Open 2018 HSBC BWF World Tour Super 1000. The analysis covered all of Ginting's matches during the tournament, starting from the first round up to the final, offering a complete view of his technical performance at different stages of competition. This tournament was chosen because of Ginting's performance, that was able to beat the world's leading-ranked players and the availability of official and complete match recordings on BWF TV.

Ethical Considerations

This study used publicly available official badminton match recordings provided by the Badminton World Federation (BWF) and involved no direct interaction, intervention, or data collection from the athlete. Therefore, informed consent and formal ethical approval were not required. The analysis was limited to observable technical performance data from publicly available competition footage and was conducted solely for scientific and performance-analysis purposes.

Instrument

Performance data were gathered from official match videos provided by the Badminton World Federation (BWF). A structured observation tool was created based on principles of badminton notational analysis and existing literature on technical performance indicators. This tool was used to record when and how technical actions occurred in relation to winning or losing points. The variables observed included serves, net, smashes, drives, drop shots, lobs, chops, defensive, and clears. There were nine variables observed and analysed according to theoretical studies (Abdullahi & Coetzee, 2017; Abián et al., 2014; Abian-Vicen et al., 2013; Brahms, 2014; Phomsoupha & Laffaye, 2014). To guarantee the accuracy of the data, the observation tool was reviewed by badminton experts who have experience in coaching and performance analysis. Observer consistency was checked by repeatedly observing selected matches. Evaluation of technical actions is carried out through systematic observation of video recordings of matches. Based on established observation criteria, each action is identified, classified, and recorded using a dichotomous scoring system. In this system, a score of "1" is given for successful execution of the technique, while a score of "0" signifies an unforced error. The technical variables and the respective adopted criteria are presented below:

Table 1. Variable Definition

Variable	Definition
Service	A stroke to start the game to land the shuttlecock in the opponent's service area.
Netting	A stroke or push where the shuttlecock lands as close as possible to the net on the opponent's side, including intercept movements.
Smash	A fast and powerful downward stroke directed into the opponent's court.
Drive	A flat, fast stroke that skims just over the net.
Dropshot	A soft stroke aimed at pushing the shuttlecock to the front of the opponent's court.
Lob	A high stroke directed toward the back of the opponent's court.
Chop	A soft stroke aimed at pushing the shuttlecock towards the back of the attacking line.
Defend	Receiving and returning an attack from the opponent.
Clear	A stroke that sends the shuttlecock flat or high towards the opponent's court.

Data Analysis

Each match was analysed using systematic notational analysis. Every technical action was coded according to specific operational definitions and categorised as either successful (point gained) or unsuccessful (point lost). The frequency and percentage of each technical action were calculated to describe Ginting's performance throughout the tournament. Descriptive statistical analysis was used to summarise how technical actions were distributed and how points were scored. The results were then interpreted by combining ideas from badminton performance analysis with previous research to provide a detailed understanding of the technical elements that contributed to Ginting's success during the tournament.

RESULTS AND DISCUSSION

Results

Match Duration

The analysis included four matches played by Anthony Sinisuka Ginting from the Round of 16 to the final of the 2018 China Open, comprising a total of 10 sets. The duration of each set was recorded and is presented in **Table 2**.

Table 2. Total Time Required

Match	Opponent	Set	Duration
1	Viktor Axelsen	First set	22 min
1	Viktor Axelsen	Second set	23 min
2	Chen Long	First set	26 min
2	Chen Long	Second set	32 min
2	Chen Long	Third set	27 min
3	Chou Tien Cheng	First set	18 min
3	Chou Tien Cheng	Second set	25 min
3	Chou Tien Cheng	Third set	25 min

Match	Opponent	Set	Duration
4	Kento Momota	First set	31 min
4	Kento Momota	Second set	32 min
Overall	—	**10 sets**	**Mean = 26.1 min**

Note. min = minutes.

Across the 10 sets, the mean set duration was 26.1 minutes. The shortest set lasted 18 minutes, occurring in the first set against Chou Tien Cheng, whereas the longest duration was 32 minutes, recorded in the second set against Chen Long and the second set against Kento Momota. Matches 2 and 3 were completed in three sets, whereas Matches 1 and 4 were completed in two sets.

Point Distribution

The point distribution across the four matches and 10 sets is presented in **Table 3**. Ginting won 8 of the 10 sets analysed, with set scores ranging from 21–17 to 23–21 in the sets he won and 18–21 and 12–21 in the two sets he lost. The point difference varied across the matches, ranging from a 9-point deficit (−9) in the first set against Chou Tien Cheng to a 6-point winning margin (+6) in the third set against the same opponent. In the match against Viktor Axelsen, Ginting won both sets with margins of 3 and 4 points, respectively. Against Chen Long, he lost the first set by 3 points before winning the subsequent two sets by 2 and 5 points. Against Chou Tien Cheng, he lost the first set by 9 points but won the following two sets by 4 and 6 points. In the final against Kento Momota, Ginting won both sets by 2 points each.

Table 3. Point Distribution Across Matches and Sets

Match	Opponent	Set	Score	Point Difference
1	Viktor Axelsen	First set	21–18	3
	Viktor Axelsen	Second set	21–17	4
2	Chen Long	First set	18–21	−3
	Chen Long	Second set	22–20	2
	Chen Long	Third set	21–16	5
3	Chou Tien Cheng	First set	12–21	−9
	Chou Tien Cheng	Second set	21–17	4
	Chou Tien Cheng	Third set	21–15	6
4	Kento Momota	First set	23–21	2
	Kento Momota	Second set	21–19	2

Ginting won 8 of the 10 sets analysed. The largest winning margin was 6 points, recorded in the third set against Chou Tien Cheng, while the largest point deficit was 9 points, recorded in the first set against the same opponent. Ginting experienced set losses only in the first sets against Chen Long and Chou Tien Cheng.

Distribution of Technical Actions

The distribution of the analysed technical actions across the 10 sets is presented in **Table 4**. The technical actions included service, netting, smash, drive, dropshot, lob, chop, defend, and lifts. The values represent the recorded frequency of each action, with the corresponding percentage shown in parentheses.

Table 4. Distribution of Technical Actions Across Matches and Sets

Match (Set)	Service (%)	Netting (%)	Smash (%)	Drive (%)	Dropshot (%)	Lob (%)	Chop (%)	Defend (%)	Lifts (%)
1 (1)	21 (11)	50 (26)	18 (9)	15 (8)	20 (11)	5 (3)	19 (10)	18 (9)	24 (13)
1 (2)	21 (15)	26 (18)	14 (10)	14 (10)	28 (20)	6 (4)	2 (1)	8 (6)	22 (16)
2 (1)	17 (7)	70 (30)	25 (11)	15 (6)	14 (6)	23 (10)	6 (3)	14 (6)	52 (22)
2 (2)	21 (9)	74 (30)	28 (11)	26 (11)	19 (8)	23 (9)	10 (4)	11 (4)	35 (14)
2 (3)	21 (11)	55 (28)	17 (9)	16 (8)	20 (10)	12 (6)	5 (3)	13 (7)	40 (20)
3 (1)	12 (7)	39 (23)	16 (10)	8 (5)	17 (10)	22 (13)	5 (3)	14 (8)	33 (20)
3 (2)	20 (12)	50 (29)	16 (9)	10 (6)	11 (6)	6 (4)	4 (2)	14 (8)	40 (23)
3 (3)	21 (12)	44 (25)	23 (13)	10 (6)	17 (9)	16 (9)	8 (4)	12 (7)	28 (16)
4 (1)	22 (8)	74 (28)	31 (21)	10 (4)	12 (5)	16 (6)	19 (7)	33 (13)	43 (17)
4 (2)	21 (8)	70 (25)	47 (17)	12 (4)	26 (9)	9 (3)	19 (7)	25 (9)	51 (18)

Across the four matches and 10 sets, netting showed the highest proportion of successful technical actions among the analysed variables. However, the distribution of point outcomes differed from the distribution of technical actions. In particular, smash was associated with the highest number of points across the analysed sets. The point outcomes for each technical action are presented in **Figure 1**.

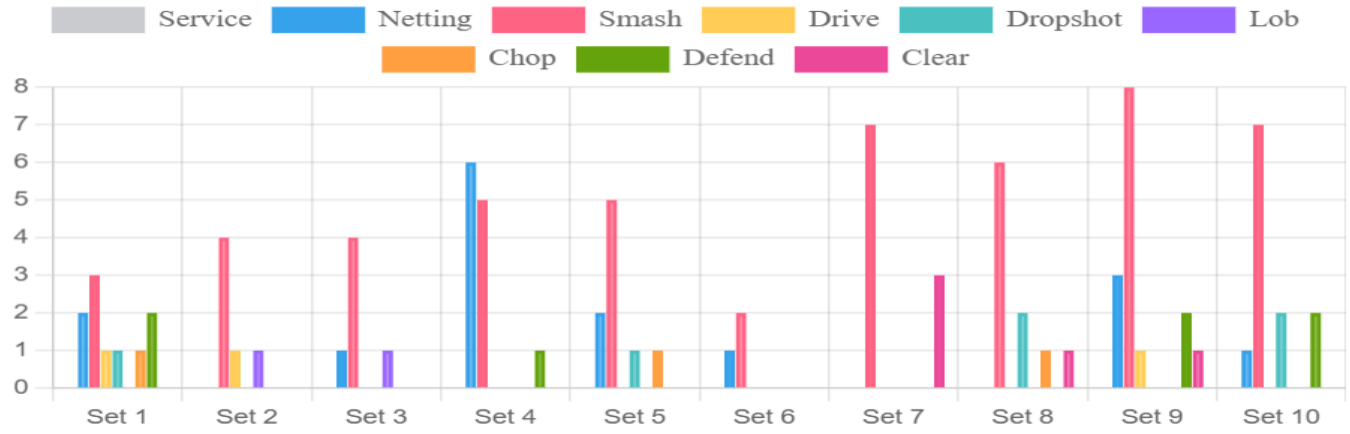

Figure 1. Point Outcomes by Technical Action

The smash generated a total of 51 points, corresponding to an average of 5.1 points per set across the 10 sets. Smash produced the highest number of points in 9 of the 10 sets. In one set of the fourth match, netting generated 6 points, compared with 5 points from smash. The highest number of points generated by smash in a single set was 8, whereas the lowest was 2.

Success and Unforced Error

The distribution of successful actions and unforced errors was further examined to describe the outcomes of the technical actions across the four matches and 10 sets. The average percentages of successful actions and unforced errors for each technical variable are presented in **Figure 2**. This analysis complements the point-outcome results presented in **Figure 1** by showing the relative proportions of successful executions and unforced errors for each technical action.

As shown in **Figure 2**, the smash demonstrated the largest difference between successful actions and unforced errors. The average success rate for the smash was 57.0%, whereas the corresponding unforced error rate was 14.6%. The netting action showed the highest overall proportion of successful actions; however, its average unforced error rate was also relatively high, at 26.7%.

Overall, the technical actions demonstrated different patterns of successful execution and unforced errors. The smash was characterised by a comparatively high success rate and a substantially lower unforced error rate, whereas netting combined a high proportion of successful actions with a relatively higher proportion of unforced errors.

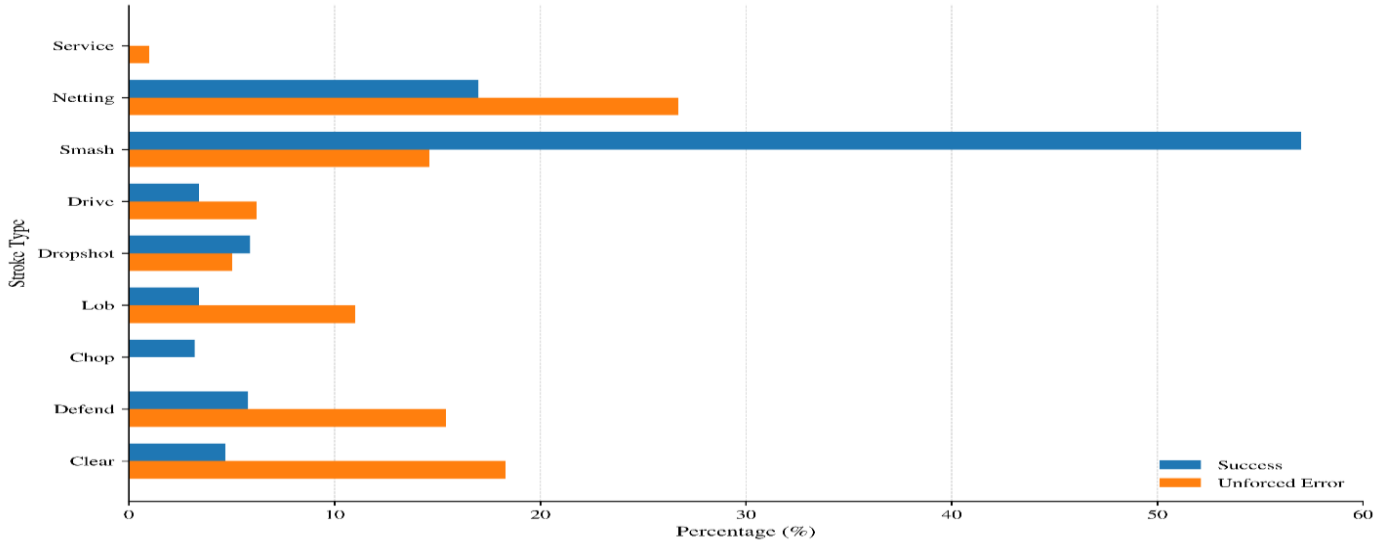

Figure 2. Comparison of Successful Actions and Unforced Errors

Discussion

The present study indicates that technical effectiveness in elite men's singles badminton should be considered not only from the frequency of technical actions but also from their contribution to point outcomes and associated errors. The most prominent finding was the contribution of the smash, which generated the highest number of points and showed a more favorable balance between successful actions and unforced errors. In contrast, netting showed a high proportion of successful actions but was also associated with a relatively higher proportion of unforced errors. This distinction indicates that action frequency does not necessarily correspond directly to point-producing effectiveness.

The predominance of the smash as a point-producing action is consistent with previous research showing the importance of smash-related actions in elite men's singles badminton (Lin et al., 2022). The effectiveness of the smash may be related to its ability to limit the opponent's response time and create direct scoring opportunities. However, smash performance depends on more than hitting force. Grip strength and finger force contribute to jump-smash effectiveness (Kao et al., 2024), while acceleration and follow-through influence stroke quality (Krishnaram et al., 2024). Racket–shuttlecock contact position and body positioning also affect the effectiveness and accuracy of the smash (McErlean-Naylor et al., 2020); (Li et al., 2016). These findings provide a biomechanical basis for understanding why effective smash execution can contribute substantially to point production.

The findings also highlight the importance of balancing successful execution with error control. Although netting had a high proportion of successful actions, its relatively high unforced-error rate suggests that frequent execution does not necessarily guarantee consistent point production. Similarly, defensive errors may directly contribute to point loss and reduce opportunities to transition from defence to attack. Effective defence requires rapid responses and accurate control of shuttle direction, particularly when responding to fast and varied shots (Huang et al., 2023). Previous research has also associated smash accuracy with greater point production among successful players (Lin et al., 2022), while successful direct shots contribute substantially to rally outcomes (Hammes & Link, 2024). Thus, the present findings reinforce the importance of both attacking efficiency and defensive consistency.

The variation in match duration also provides an important context for interpreting technical performance. Badminton requires repeated high-intensity actions interspersed with recovery periods and therefore depends on both aerobic and anaerobic capacities (Phomsoupha & Laffaye, 2014). Previous studies have similarly emphasised the contribution of aerobic and anaerobic fitness to badminton performance (Apriantono et al., 2020; Ramos Álvarez et al., 2016). Aerobic capacity supports sustained performance and recovery, whereas anaerobic capacity contributes to repeated explosive actions. Badminton-specific endurance is also important for maintaining performance during prolonged match demands (Lim et al., 2023). Aerobic capacity has been

associated with recovery during repeated badminton activity (Barreira et al., 2016), while repeated high-intensity efforts require the ability to maintain performance across intermittent exercise (Chia et al., 2019). Nevertheless, because physiological variables were not directly measured in the present study, these mechanisms should be considered contextual explanations rather than direct findings.

From a practical perspective, the findings suggest that coaches should evaluate technical actions not only according to their frequency but also according to their success-to-error balance and contribution to point outcomes. In particular, the smash may represent an important attacking weapon, whereas netting and defensive actions may require greater attention to technical consistency and decision-making. Notational analysis can support this process by converting match footage into structured information on technical actions and scoring outcomes. Recent developments in video-based and immersive badminton analysis further demonstrate the potential of systematic performance analysis for high-performance coaching (Chen et al., 2023; Lin et al., 2023).

Several limitations should be considered. The study analysed only one athlete and one tournament, limiting generalisability. In addition, physiological, psychological, tactical, and environmental variables were not directly measured, and opponent characteristics were not statistically modelled. Therefore, the observed technical patterns should be interpreted as context-specific performance characteristics rather than causal determinants of success. Future studies should analyse larger samples across multiple tournaments and integrate notational analysis with physiological, movement, psychological, tactical, and opponent-related variables. Such multidimensional approaches could provide a more comprehensive understanding of how technical actions and contextual factors interact to influence point and match outcomes.

CONCLUSION

This study was conducted to examine the scoring methods and technical techniques used by Anthony Sinisuka Ginting during the VICTOR China Open 2018 HSBC BWF World Tour Super 1000, using a notational analysis method. The results indicate that smash shots were the main way Ginting scored points, showing how important offensive play was to his performance. On the other hand, failed points were often linked to poorly executed defensive moves. One important observation was that net shots resulted in both the highest number of successful points and the highest number of errors, suggesting that netting is a technique with high risk and high reward, which can greatly impact the result of a match.

The unique aspect of this study is its focus on analysing the performance of a specific athlete in an elite-level competition. Unlike earlier studies that looked at overall match data or compared winners and losers, this research offers a detailed look at the technical actions that helped a top badminton player succeed. The findings add to existing knowledge about the performance analysis of badminton singles athletes and could help coaches and players create better training and match plans. Future studies should look at an athlete's performance throughout a tournament, from the early rounds to the final match, to gain a more complete and accurate understanding of an athlete's technical skills, strategic and psychological changes, and how performance remains consistent in different competitive situations.

ACKNOWLEDGEMENTS

The authors would like to express their sincere gratitude to all individuals and institutions who supported the completion of this study. The authors also thank the relevant parties who contributed to the provision of data, research assistance, and logistical support throughout the study.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest related to the research, authorship, or publication of this article.

AI DISCLOSURE STATEMENT

The authors used DeepL Write and Grammarly solely for language editing, grammar checking, and improving the clarity of the manuscript. These tools were not used to generate, analyse, interpret, or develop the scientific content, research methods, results, or conclusions of the study.

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