

Development of Attacking Strategies in Badminton Double Category: Construct Validity and Inter-Rater Reliability

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Abstract: One of the game categories in badminton is doubles. Doubles games demand consistency in launching attacks that require physical aspects and complex strategies. The purpose of this study is to validate and develop the concept of attack strategy in badminton games in the doubles category. The research method is 3D. Participants were documented in the form of articles and 6 material experts, 3 national licensed coaches, and 3 academics with master's and doctoral degrees specializing in badminton. The data analysis technique used Aiken's content validity. The research stages include (1) Define, defining and analyzing the needs to develop attacking strategy products, (2) Design, analyzing articles and videos and designing a 1-5 Likert scale questionnaire to refine the development of attacking strategy products, (3) Development, assessing attacking strategy products with Delphi techniques until consensus from 6 experts. Inter-Rater Reliability Test using Cronbach's Alpha and Inter-Rater Agreement Test using ICC. Based on the results of the study, it was found that the content validity value were 0.71-1.00 and Cronbach's Alpha value were 0.265>0.6, respectively. In addition, the ICC value of a single measurement was 0.30 with a mean measurement value of 0.157>0.75. In conclusion, the construct of attacking strategy in badminton doubles has a high and good level of content validity. The concept of attacking strategy can be a recommendation for badminton coaches to apply the concept that the author developed.

Keywords: content validity; attacking strategy; doubles category; badminton



INTRODUCTION

Badminton is a popular sport globally, including in Indonesia, with more than 200 million fans worldwide (Arduta et al., 2020; Phomsoupha & Laffaye, 2015; Sugiharto et al., 2022). Apart from being a healthy sport, badminton is an achievement sport that requires mature techniques in competition (Suratman & Fransiska, 2014; Williyanto et al., 2021). Internal factors in badminton achievement are technical skills, psychology, physical condition, strategy and tactics, and motivation. External factors in badminton achievement include coaching, the role of coaches and parents, infrastructure, and the influence of the surrounding environment. The goal of the badminton game is that players must get as many points as possible by providing resistance by dropping shuttlecocks in the opponent's playing area and minimizing the points obtained by the opponent (Herman, 2019; Vernando et al., 2017).

Badminton doubles games have different demands from the singles category (Khorul Umam & Widodo, 2017). Doubles games play a variety of styles in badminton, two players are an important unit to compete innovatively (Mangun et al., 2017). Winning a doubles game, players must work together cooperatively and effectively. Studies state that doubles players can be organized with one of the following three formations: (1) Side by Side; (2) Front and Back; or (3) Circulate (Mangun et al., 2017). In doubles, there are two important roles of players, namely as playmakers and finishers.

The complexity of badminton games certainly has a lot to consider, one of which is strategic planning to optimize tactics in badminton doubles games. Many strategies used, such as attack and defense strategies, require the simultaneous development of several components, such as technical, physical, tactical, and psychological components. The four components work together to increase success in the training process and achieve maximum achievement (M. S. Wijaya et al., 2023). In addition, based on the literature review, the strategy and application of techniques and tactics in men's and women's doubles mostly relies on hard shots. The main strategy in doubles is “kill and block”, which wins the game with fast and continuous attacks from behind and quick interceptions from the front (Feng & Chen, 2023).

However, the author criticizes that some of the existing strategies still have gaps. The problem is the lack of effectiveness in applying attacks in the double back position, which results in attacks becoming monotonous, undirected, and easily read by the

opponent. This causes fatigue and decreased energy, and makes the match less interesting. In addition, some literature studies still emphasize players in mastering techniques that are good enough, but are not balanced with the ability to think about effective strategies and tactics so that they drain more energy (Rubiyatno & Suganda, 2021). Then, the level of anxiety and self-confidence of athletes with achievement motivation affects the application of strategies and tactics in training and matches (K. M. I. Wijaya, 2018). The problem has been given a solution but has not received in-depth attention.

Therefore, to provide a solution and cover the gap of previous research, the author aims to develop a strategy to attack badminton in the doubles category. This development will involve identifying the direction of the shuttlecock and exploring the opponent's weak points, which will then be applied by players during practice and matches. The author hopes that by implementing this design, it can improve athletes' performance in doubles matches. In addition, there will be an emphasis on the importance of mastering basic techniques and the role of coaches and parents in motivating and managing the psychological aspects of athletes. The authors' aim of this study was to evaluate the level of construct validity of the strategies to be established. In addition to new evidence showing that coaches need scientific enrichment through innovation and new concepts to develop success, it is expected that this approach will be adopted by academics and practitioners. As a result, it is hoped that this study will make a positive contribution to the understanding and development of doubles badminton attacking strategies aimed at improving national performance.

METHOD

This type of research uses a 3D research development approach (Define, Design, and Development) with a mix of quantitative and qualitative analysis. Define, the author defines the construction based on analytical studies and field observations as the basis for developing strategies and rationalizing problems. Design, the author designs the construct on the basis of needs analysis through video documentation, articles, and suggestions from several trainers. In addition, the author compiled a 1 - 5 Likert scale questionnaire with indicators of measurable attack principles, change of pace, deception, economy, bodyshot, game rhythm control, and mind games (psychological games). Development,

the author compiles and assesses constructs to experts related to data collection techniques using the Delphi technique, namely meeting one by one expert until consensus occurs regarding the development of attack strategies (Yudhistira et al., 2021).

The participants in this study were 6 experts and documents containing strategies and tactics in badminton. The qualifications of the experts are as follows: 3 experts who are licensed national coaches in badminton, and 3 academics with master's and doctoral degrees in sports evaluation and badminton. Qualitative analysis techniques are in the form of suggestions and input, while quantitative analysis techniques use the Aiken formula (Aiken, 1985). Aiken's formula is as follows:

$$V = \sum s / [n (C-1)]$$

$$S = r - lo$$

$$Lo = \text{lowest number}$$

$$C = \text{highest number}$$

$$R = \text{score given by the expert}$$

Reliability is the level of consistency of assessment from repetition of assessment procedures. The level of reliability of the assessment results can determine the level of confidence in the assessment results (Tomoliyus et al., 2013). The purpose of the inter-rater reliability test is to determine how well the experts or raters agree (agreement) on how to assess each item on the instrument, using Cronbach's Alpha and Intraclass Correlation Coefficients (ICC) using SPSS 2023 software. There are four classification results of inter-rater reliability, which are as follows: In terms of quality, Kappa < 0.4 is bad, Kappa 0.4-0.60 is fair, Kappa 0.60-0.75 is acceptable, and Kappa > 0.75 is excellent (Fleiss, 2003).

RESULT

Quantitative Result

Quantitative results obtained from Aiken's analysis, which aims to see the construct validity of the development of double category badminton attacking strategies and attack concepts are presented in Table 1. Based on the table of validity calculation results using the Aiken formula, 20 statement items have a coefficient V between 0.71

and 1.00. Most items show high validity with a value of 0.92 on eight items. Item twelve has the highest value (1.00), while item twenty has the lowest value (0.71). Some items, such as item nineteen (0.75) and item eighteen (0.79), showed relatively low validity compared to others. Overall, these results indicate that most items have met the criteria for good validity.

Table 1. Results of Content Validity Test with Aiken Formula

NO	Statement	RATER						S = r - lo						$\sum s$	n(c - 1)	V
		1	2	3	4	5	6	1	2	3	4	5	6			
1	Item 1	5	5	3	5	5	5	4	4	2	4	4	4	22	24	0,92
2	Item 2	4	5	4	5	5	5	3	4	3	4	4	4	22	24	0,92
3	Item 3	5	5	4	5	5	5	4	4	3	4	4	4	23	24	0,96
4	Item 4	5	5	3	5	5	5	4	4	2	4	4	4	22	24	0,92
5	Item 5	5	5	3	5	5	5	4	4	2	4	4	4	22	24	0,92
6	Item 6	4	5	5	5	5	4	3	4	4	4	4	3	22	24	0,92
7	Item 7	5	5	4	5	5	4	4	4	3	4	4	3	22	24	0,92
8	Item 8	5	5	2	5	5	4	4	4	1	4	4	3	20	24	0,83
9	Item 9	4	5	3	5	5	3	3	4	2	4	4	2	19	24	0,79
10	Item 10	5	5	1	5	5	4	4	4	0	4	4	3	19	24	0,79
11	Item 11	4	5	5	5	5	4	3	4	4	4	4	3	22	24	0,92
12	Item 12	5	5	5	5	5	5	4	4	4	4	4	4	24	24	1,00
13	Item 13	5	5	5	4	4	3	4	4	4	3	3	2	20	24	0,83
14	Item 14	4	5	2	5	4	4	3	4	1	4	3	3	18	24	0,75
15	Item 15	5	5	4	5	5	4	4	4	3	4	4	3	22	24	0,92
16	Item 16	5	5	3	5	5	5	4	4	2	4	4	4	22	24	0,92
17	Item 17	4	5	4	5	5	5	3	4	3	4	4	4	22	24	0,92
18	Item 18	5	5	1	4	5	5	4	4	0	3	4	4	19	24	0,79
19	Item 19	4	5	2	4	5	4	3	4	1	3	4	3	18	24	0,75
20	Item 20	5	5	1	4	5	3	4	4	0	3	4	2	17	24	0,71

Qualitative Result.

These qualitative results were obtained from the Delphi approach in accordance with the suggestions and input from six relevant material experts presented in Table 2. The feedback and recommendations from the six experts are summarized in the table. In order to build models and concepts to develop attacking strategies for doubles badminton, the researchers made revisions and changes in response to recommendations and input. Suggestions and input that have been improved which can be seen in the concept of developing double category badminton attacking strategies, Figure 1 to Figure 4.

Table 2. Results of Qualitative Analysis in the form of Suggestions and Feedback

Expert	Feedback and Recommendation
Expert 1	Point out the principles of change of pace and deception. The descriptions of the principles of economy and rhythm control are concretized. The concept of the picture is given a number the direction of the stroke is given a color, and the picture of the position of the partner and opponent. After revision, the content of the construct and concept are by the provisions.
Expert 2	The position of the opponent is questioned in the indicator of the principle of measured attack, and the description of at least three statements, then the principles of change of pace and deception have almost the same details, and for the description of at least three detailed statements. The body shot principle is explained the direction of the body shot which is indicated as a weakness. After being given suggestions, there have been additions to the details of each detailed indicator. Each indicator describes the variables to be studied when developing strategies and tactics.
Expert 3	Measurable attack parameters should be clear, and descriptive explanations regarding the focus of the game organized and planned. Minimize floating the shuttlecock because the definition of attack will be inversely proportional to the definition of defense. Deception is a deceptive move to damage the opponent's position by deceiving. Attacks must be launched as effectively and efficiently as possible. Control of the rhythm of the game is carried out from the beginning to the end of the match whether the score is ahead or behind. The concept of drawing is given a procedure when the opponent's shuttlecock return is not by the concept of attack.
Expert 4	The explanation of each indicator is concrete and descriptive without any revision. Some sentences of the image concept procedure were reduced because they could cause ambiguity. The addition of procedures and understanding of the concept of the fourth point of Figure 2, namely "hard smash towards the center between 2 opponents". The overall concept of the picture is quite good without any deep changes.

Expert 5 For attacks not only at empty spots, if the opponent is not ready, you can also attack towards the body or body shot. Changing the direction of the shuttlecock is also important because it is useful to outwit the opponent. Looking for attack points is not only 1 or 2 points, there are more than 2 attack points that are very crucial for the opponent. Constructs containing indicators and image concepts are good enough without any revisions or changes.

Expert 6 Control the rhythm of the game better from the start because the faster we control the game, the more energy we save. Trick shots are used only when necessary and not too often because the opponent is likely to understand the trick moves. In concept 2 smash does not have to be to the backhand, smash direction is more flexible because doubles more often target the forehand position. Sharp smashes do not need to target the outline or to edge, it is safer to go toward the center between the opponent's positions. Constructs containing indicators and image concepts are good enough but more details are added to the image concept.

Inter-Rater Reliability Test Result

The results of the inter-rater reliability test by applying Cronbach's Alpha, using SPSS 2023 software, are presented in Table 3. The reliability test showed a Cronbach's Alpha value of 0.265 which greater than 0.60. The results of this analysis show an average inter-rater agreement of 0.265. This result indicates that the responses of the six experts are consistent, implying that the content of this construct of double attacking strategy in badminton is reliable.

Table 3. Inter-Rater Reliability Test Results

Cronbach's Alpha	N of Items
.265	6

Inter-Rater Agreement Test Results

The inter-rater reliability test was conducted using the intraclass correlation coefficient (ICC). This method aims to measure the consistency or level of agreement among several raters on an object of assessment. The results of the ICC calculation that

illustrate the level of reliability are presented in detail in Table 4. The table results show that the consistency for one rater is 0.30 while the average inter-rater agreement is 0.157. Assuming that the findings of the ICC value are categorized according to the suggested dependency, then the agreement between raters has a good agreement (Wibowo et al., 2022; Yudhistira et al., 2021).

Table 4. Intraclass Correlation Coefficient Results

	ICC	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.030 ^a	-.025	.149	1.361	19	95	.166
Average Measures	.157	-.169	.512	1.361	19	95	.166

The Results of the Attacking Strategy Development Concept

At this stage, the author wants to implement the results of the revised concept of the image of the development of attacking strategies for badminton in the doubles category. The concept of developing attacking strategies itself consists of 4 illustrated concepts that have been equipped with attack directions and procedures, which are presented as follows.

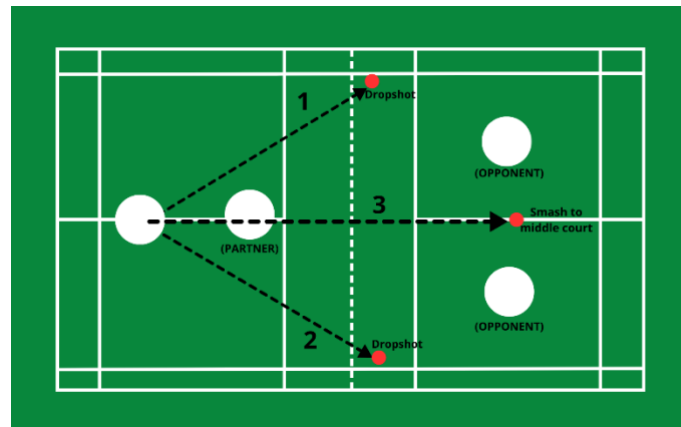


Figure 1. Attack strategy with two dropshot and smash variations

The attack procedure with the variation of two dropshots and smash includes; 1) take a quick dropshot between the three front points with the target area near the net or service line, 2) if the opponent catapults the shuttlecock, take a dropshot in the opposite direction with a sharp angle aimed at the opponent's partner, 3) if the opponent is netting, the front player takes over; if the shuttlecock is catapulted, aim the smash to the center of

the court, 4) perform sharp or flat smashes, taking into account the power to avoid the risk of outs, 5) attacks should be flexible and adapted to the opponent's conditions and the dynamics of the match

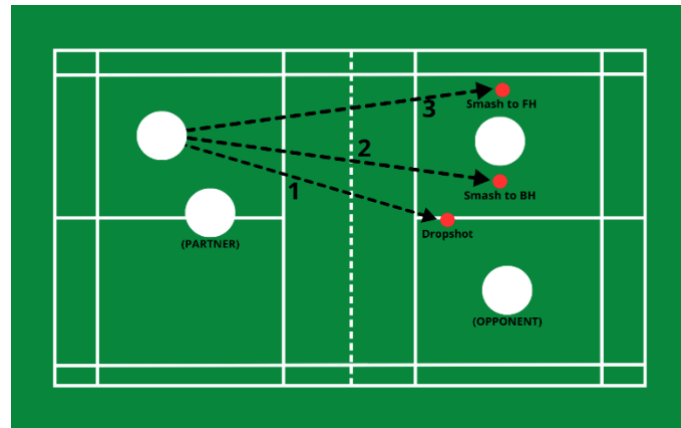


Figure 2. Attack strategy with dropshot and two smash variations

The attack procedures with dropshot and two smash variations include; 1) take a dropshot or cut smash to the center or one of the three points to disrupt the opponent's defensive position, 2) observe the position of the receiving opponent, then take a sharp smash to the center or aim at the backhand defense, 3) if the shuttlecock is returned unlucky, the front player cuts the shuttlecock lane, 4) if the opponent returns with a high lob that is unlucky, take a sharp smash to the forehand defense or the outside line, or a hard smash to the center between the opponents, 5) the attack must be flexible and adjusted to the opponent's condition and the dynamics of the match.

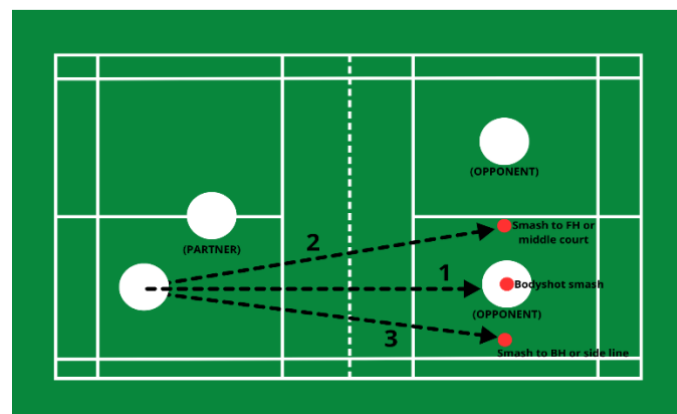


Figure 3. Attack strategy with variations of bodyshot smash and two smashes

The attack procedures with variations of bodyshot smash and two smashes include; 1) perform a hard body shot smash, targeting the humeral articulation area (between the armpit and chest), 2) if the shuttlecock is floated, continue with a sharp smash to the center to surprise the opponent and move away from the range, 3) if the opponent's return is unbearable, perform a sharp smash to the left or the direction of the backhand defend, targeting the outside line but not too edge, 4) the attack must be flexible and adjusted to the opponent's condition and the dynamics of the match.

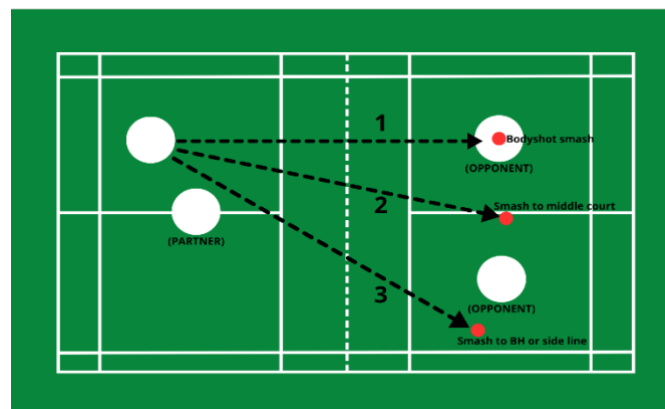


Figure 4. Attack strategy with a variation of three consecutive smashes

The attack procedure with a variation of three consecutive smashes includes; 1) perform a hard body shot smash, targeting the humeral articulation area (between the armpit and chest), 2) if the opponent returns by catapulting the shuttlecock, perform a sharp and swooping hard smash towards the center of the opponent's second defense where one of the opponents will return the shuttlecock, 3) if the shuttlecock is catapulted again, end with a sharp smash to the sideline, targeting the backhand defense or the outside line, 4) the concept of attack is flexible or can be done at any time considering the situation of the opponent and the match which is often different.

DISCUSSION

Content validity and reliability, such as Cronbach's Alpha or inter-rater reliability, were applied in this study with the aim of evaluating the accuracy of the instrument or model in measuring the variables under study. This aims to ensure that the instrument consistently and precisely measures the intended construct in accordance with scientific standards. Based on the development review, that the content validity has covered the coefficient value $V 0.71 - 1.00$ with a table V value of 0.87 . The results of previous studies

state that validity with a magnitude of 0.80 has good validity (Yudhistira et al., 2021). This shows that the instruments used in data collection have a good level of consistency or validity. The reliability test using Cronbach's Alpha resulted in a value of $0.265 > 0.6$, thus indicating that the model developed can be considered reliable. The single measure value was recorded at 0.30, while the average value was 0.157, based on the reliability results of the intraclass correlation coefficient. Experts state that if the value is > 0.75 , then a measuring instrument can be said to have good reliability (Wibowo et al., 2022). Based on these opinions, it can be said that the construction of attacking strategies for badminton in the doubles category has high validity and good reliability. In other words, all experts strongly agree (Yudhistira & Tomoliyus, 2020; Yulianto et al., 2021, 2024).

Badminton attacking strategies in the doubles category must pay attention to important aspects such as basic techniques, physical condition, and mentality in applying the concept. Basically, attacking strategies are fast and deadly which requires hard work and varied and selective placement. In line with previous studies, that strategies and tactics will not run well without aspects of basic techniques and supporting physical components (Subarkah & Marani, 2020). This is in accordance with the fact that the basic component for achieving sports achievement is the physical component in addition to other important components such as technique, tactics, and mental (psychology) (Akhiruyanto et al., 2022; Dameria et al., 2023). As with the basic techniques of the game, learning about how to determine strategies and tactics both attacking and defending for athletes needs to be applied since beginners as effective long-term coaching (Rubiyatno & Suganda, 2021). Therefore, to modify the program appropriately, coaches must understand the growth and development of athletes (Hadi & Yudhistira, 2023).

Declaring that aspects of badminton attacking strategies have proper automation or reflex movements if athletes have constant and trained skills, and also learn proper strategies to produce optimal play during matches (Xu, 2022). Training methods consist of all approaches or procedures used to deliver the learning resources required during training, by analyzing basic technical abilities and attacking strategies used by coaches in structured and effective attacks (Hartono et al., 2024). This makes athletes have the appropriate instincts by organizing deadly attacks during the match. Exercise is to improve the quality of one's personality to be positive in addition to optimal physical condition and basic technical skills. Furthermore, it states that training must be

programmed, planned, structured and systematic to maximize individual results and performance (Ilham Irawan et al., 2020; Rohmah & Purnomo, 2022).

In the context of strategy delivery, coaches must have sufficient understanding. The coach has good analytical and pedagogical principles, the meaning of analysis includes or sees gaps in training or matches. Meanwhile, pedagogics requires coaches to uphold good teaching techniques with a professional role developed through tiered training so that they can provide good and meaningful results (Hastuti et al., 2021). Sports pedagogy refers to the rules and practices for acquiring sport-specific skills, relating to how one learns about the abilities and skills of children who use sports to explore potential (Hidayah et al., 2023). The positive relationship between coaches and athletes during training can provide mental strength for athletes during training or competition (Ilham Irawan et al., 2020). Scientific efforts must be well thought out and realistically implemented. This is directly related to the coach's ability to use and develop variants of efficient exercise methods or programming for skill development (Wicaksono et al., 2022). For an effective coach to have a deep understanding of theory and practice in strategy and tactics analysis includes development and concepts. Success depends on the athlete's willingness, coordination with coaches, supportive parents, and organizational management that is implemented as effectively as possible so that athletes obtain social, individual, and health benefits (Hidayah et al., 2023).

CONCLUSION

Based on the results of the discussion, it can be concluded that the development of double category badminton attacking strategies is a significant effort in improving athlete performance in doubles matches. The results of the construction validity of the doubles category badminton attacking strategy, with most items meeting the criteria of high validity and good reliability. The discussion of this study underscores the importance of basic technical, physical condition, and psychological aspects in developing and implementing doubles badminton attacking strategies. Coaches need to consider all these aspects in designing effective training programs for athletes. It is hoped that this study will make a significant contribution to the understanding and development of doubles badminton attacking strategies.

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