

Comparative Study on the Characteristics of Technical and Tactical Application in Different Football Formations

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Abstract: This study delves into the application characteristics of techniques and tactics employed in diverse football formations, with the objective of uncovering the unique traits of each formation in modern football matches and their subsequent influence on game outcomes. By analyzing formations like 4-2-3-1, 4-5-1, and the emerging "net structure," the study uncovers distinct strengths and constraints for each in both offensive and defensive strategies. The versatile 4-2-3-1 formation is favored for its balanced approach, excelling in midfield control and swift counterattacks. Meanwhile, the 4-5-1 formation bolsters ball control and distribution by increasing midfielders, making it ideal for intense defensive scenarios and wing counterattacks against formidable opponents, albeit at the cost of offensive diversity due to limited forwards, necessitating midfielders to compensate. The innovative "net structure" approach fosters offensive prospects through strategic player positioning and proactive movement, centering on the ball-holding player and ensuring offensive fluidity and potency. Additionally, the defensive counterattack strategy shines against powerful adversaries, leveraging robust defense and rapid counterattacks, demanding high defensive awareness and swift counterattacking abilities from players. This study employs multi-dimensional quantitative indicators and data analysis to illuminate each formation's true performance, offering a scientific foundation for coaches and teams to make informed tactical decisions and adjustments, ultimately enhancing overall competitiveness.

Keywords: Football Formation; Tactics; Transition between Attack and Defense; Quantitative Analysis

1. Introduction

As a global sport, football has a long history of development and wide influence. At first, football emerged in Europe and quickly spread to all parts of the world, becoming a universally accepted competitive activity. Over time, football has not only achieved remarkable development at the competitive level, but also has a profound impact in many fields such as culture, economy and society [1-3]. In modern football matches, it is of great significance to study the characteristics of technical and tactical application under different football formations. This not only helps coaches to formulate more effective tactical strategies in the game, but also helps athletes to better understand and implement tactical arrangements on the field. First, through in-depth research on these formations, coaches can choose the most appropriate formation to give full play to the team's advantages based on the actual situation of the team and the characteristics of the opponent [4]. Secondly, through the study of the characteristics of the formation, athletes can better understand their positions and tasks on the field, thereby improving the overall performance of individuals and teams [5]. In addition, for fans, understanding the technical and tactical characteristics of different formations can enhance the viewing experience and enable them to have a deeper understanding of the dynamics of the game and the performance of the team.

In recent years, the study of football formations and technical and tactical application has attracted widespread attention in domestic and foreign academic circles. Researchers have conducted in-depth discussions on the characteristics of football formations and their impact on technical and tactical application through different methods. First, research on the "net structure" tactic shows that this tactic can effectively connect the defense line, midfield line and offensive

line, emphasize the relative position relationship between players, and make the defense and offense in any area clearer and more hierarchical [6]. In international competitions, research on fast play shows that fast counterattacks and fast offenses have become the preferred tactics of the world's strong teams, and the efficiency of positional offense has gradually decreased [7]. This tactical change reflects the high attention paid to speed and efficiency in modern football. In addition, research on the "defense counterattack" tactic points out that this tactic emphasizes fast counterattacks on the basis of defense to achieve breakthroughs when the opponent's defense line is unstable [8]. Although a large number of studies have explored the technical and tactical application under different formations, there are still some shortcomings. For example, many studies focus on a single aspect of a specific formation or tactic, but lack a systematic comparison between different formations. In addition, with the development of artificial intelligence and data analysis technology, how to more effectively apply these technologies to the research and practice of football tactics is still a topic worthy of in-depth exploration [9]. Therefore, this study deeply compares the application characteristics of techniques and tactics under different football formations, provides a new theoretical framework and practical guidance for football tactical research, and has important academic value and practical application significance.

2. Characteristics of Technical and Tactical Application in Different Football Formations

2.1 Overview of Football Formations

Football formations are the specific embodiment of the positions and responsibilities of players on the field in football matches. Different formations not only affect the team's offensive and defensive strategies, but are also directly related to the rhythm and style of the game. The choice of formation is usually based on the team's overall tactical concept, the technical characteristics of the players, and the opponent's tactical arrangements. In modern football, common formations include 4-4-2, 4-3-3, 4-2-3-1, etc. Each formation has its own

unique technical and tactical characteristics and applicable scenarios. For example, the 4-4-2 formation is known for its balanced offensive and defensive capabilities and is suitable for teams that emphasize midfield control and wing attack [4]. The 4-3-3 formation, on the other hand, focuses more on offense and is usually used by teams with a strong forward line, exerting continuous offensive pressure through the flexible movement of the three forwards and the support of the midfield [2].

2.2 Ball Control and Passing Characteristics

In different formations, ball control and passing strategies are not only technical choices, but also a reflection of the overall tactical concept. Through reasonable ball control and passing strategies, the team can take the initiative in the game, control the rhythm of the game, and effectively respond to the opponent's tactical changes. This tactical flexibility and adaptability is an important trend in the development of modern football. Take the 4-5-1 formation as an example. This formation emphasizes the control of the midfield and achieves control of the ball through the dense distribution of midfield players [4]. In this formation, passing is usually short, aiming to break the opponent's defense through rapid passing in the midfield. In the "net structure" tactics, the characteristics of ball control and passing are more dynamic and flexible. This tactic emphasizes the relative position of the players and forms multiple receiving points and support points by maintaining a reasonable vertical and horizontal distance [5]. This structure makes the team's ball control and passing in any area more layered and can effectively maintain the offensive rhythm.

In addition, fast play also occupies an important position in modern football, especially in counterattack tactics. The combination of fast passing and ball control enables the team to complete the transition from defense to offense in a short time [7]. This style of play requires players to have good passing accuracy and quick decision-making ability so as to quickly break through when the opponent's defense is unstable.

2.3 Offensive and Defensive Transition

Characteristics

The transition between offense and defense plays a vital role in modern football tactics. Different formations have different characteristics in the transition between offense and defense, which affects the overall performance of the team. In the 4-5-1 formation, the tactical play of the midfielder is particularly critical. This formation emphasizes the control of the midfield and achieves a rapid transition between offense and defense through the reasonable distribution and position adjustment of the midfielder. The midfielder needs to retreat quickly when defending to form a dense defensive barrier, and needs to move forward quickly when attacking to support the forward's offensive actions [4]. The "net structure" tactic emphasizes the relative position relationship between the players and maintains the sense of hierarchy of the offense through reasonable vertical and horizontal distances. In the transition between offense and defense, this tactic requires the ball-holding player to be the core, and other players to form multiple contact points through active running to ensure the continuity of the offense and the stability of the defense during the transition [5]. In the study of fast play, the importance of fast counterattacks and fast attacks in the transition is emphasized. Modern football teams tend to organize counterattacks quickly after a successful defense to break the stability of the opponent's defense. This tactic requires players to have good speed and decision-making ability to complete the transition from defense to offense in a short time [7]. In addition, the defensive counterattack tactic also exhibits unique characteristics in transition. This tactic emphasizes stability in defense and quickly launches a counterattack when the opponent's defense is unstable. Players need to maintain a high degree of alertness and quick reaction ability when defending in order to make an effective offensive transition at the right time [8].

2.4 Space Utilization and Player Responsibilities

In modern football matches, the rational allocation of space utilization and player responsibilities is the key factor in achieving the tactical effects of different formations.

Different formations have different focuses on the allocation of space utilization and player responsibilities. The rational allocation of space utilization and responsibilities is the basis for achieving tactical intentions.

Take the 4-5-1 formation as an example. This formation emphasizes the control and organizational ability of the midfield. In this formation, the midfielders bear the heavy responsibility of connecting defense and offense. They need to maintain a good sense of position in the game to ensure that they can quickly adjust their positions during the transition between offense and defense to form an effective defensive barrier or offensive support [4]. In this formation, the responsibilities of the full-backs are not limited to defense. They also need to actively participate in the offense and expand the offensive width by assisting from the wing [10-12].

The 4-2-3-1 formation pays more attention to the balance between offense and defense. This formation requires the double defensive midfielders to provide a solid barrier when defending, and to be able to quickly advance when attacking to support the offensive players in the frontcourt. This formation emphasizes the versatility of midfielders. They not only need to have good ball control skills, but also need to insert into the opponent's penalty area at the right time to create threats [1]. In addition, the three attacking midfielders in the front court need to use space flexibly, tearing the opponent's defense line through running and passing, and creating scoring opportunities for the single striker.

The net structure tactics emphasize the mutual position relationship and dynamic coordination between players. This tactic requires players to maintain a reasonable vertical and horizontal distance on the field, and form multiple contact points and support points through active running and position adjustment to ensure the hierarchy and fluidity of the attack [5]. This tactic emphasizes teamwork and requires players to flexibly use space in different areas to ensure effective connection between offense and defense.

3. Quantitative Analysis of the Effects of Different Formations' Techniques and Tactics

3.1 Data Collection and Processing Methods

In the comparative study of the characteristics of technical and tactical application under different football formations, data collection and processing methods are one of the key steps. This study first obtained detailed technical and tactical data from multiple games, and recorded and analyzed the technical and tactical performance and common tactical strategies under different formations by watching game videos. This method can provide intuitive visual information to help researchers identify and record the positions, movement trajectories and tactical execution of players in the game. Then, mathematical statistics were used to statistically analyze the collected data. By calculating indicators such as offensive success rate and defensive stability under different formations, the laws and characteristics of different formations in offense and defense can be revealed.

3.2 Quantitative Indicator Construction

When conducting a quantitative analysis of the effectiveness of technical and tactical applications under different football formations, it is crucial to construct reasonable quantitative indicators. The construction of quantitative indicators requires comprehensive consideration of multiple factors to comprehensively evaluate the actual performance of different formations in the game.

(1) In view of the offensive and defensive characteristics of different formations, this paper introduces the offensive efficiency coefficient (OE) and the defensive efficiency coefficient (DE). The offensive efficiency coefficient can be determined by calculating the ratio of the number of scoring opportunities created in each game to the actual number of goals scored (formula 1), while the defensive efficiency coefficient can be measured by the ratio of the number of shots of the opposing team to the actual number of goals conceded (formula 2) [2].

$$OE = \frac{\text{number of offensive chances created}}{\text{actual number of goals scored}} \quad (1)$$

$$DE = \frac{\text{number of shots taken by the opponent}}{\text{actual number of goals conceded}} \quad (2)$$

(2) Cooperation and interaction between players are also important indicators for evaluating the effectiveness of formations. The

level of player interaction can be quantified through data such as the pass success rate, key pass number, and ball possession time between players. These data can reflect the team's collaborative ability and tactical execution under different formations.

(3) The flexibility and adaptability of the formation are also factors that need to be considered. The flexibility of the formation can be evaluated by the frequency and success rate of the team's formation changes during the game. At the same time, the team's ability to adjust tactics when facing different opponents can also be used as an indicator to evaluate the adaptability of the formation.

(4) This study also included psychological factors and the stability of tactical execution in the scope of quantitative indicators. By analyzing the players' psychological state in the game, the consistency of tactical execution, and their performance under pressure, the actual effect of the formation can be more comprehensively evaluated. These indicators can not only reflect the overall tactical level of the team, but also reveal the advantages and disadvantages of different formations in practical applications.

3.3 Data Analysis Results

3.3.1 Comparison of OE and DE

From the comparison results of OE and DE (Table 1), the performance of each formation in offense and defense is obviously different.

The 4-5-1 formation has a low offensive efficiency (0.50), but a relatively high defensive efficiency (0.70), which means that this formation is suitable for a tactical style that focuses on defensive counterattacks. When facing strong teams, the 4-5-1 formation can effectively limit the opponent's offense through multi-level defensive counterattack tactics in the midfield. The 4-2-3-1 formation has a relatively balanced offensive and defensive efficiency (0.60), which is suitable for a balanced offensive and defensive tactic, and is therefore widely used in modern football. This formation can flexibly respond to the opponent's tactical changes and ensure that it does not lose control during the game. The 4-4-2 formation has a medium offensive efficiency (0.55), which is suitable for a more conservative and traditional offensive and defensive balance strategy. The 3-5-2 formation has a relatively balanced offensive

efficiency (0.58) and defensive efficiency (0.60). This formation is very suitable for maintaining a solid defense when facing a strong enemy, and using counterattacks to break the opponent's defense. As a typical defensive counterattack formation, the 5-3-2 formation has a high defensive efficiency (0.75). Due to the joint defense of three midfielders and two full-backs, the opponent's offensive space can be effectively compressed. However, due to the lack of forward support, the offensive efficiency is low (0.45). It is suitable for finding offensive opportunities through solid defense and quickly counterattacking against strong enemies.

Table 1. Comparison of Offensive and Defensive Efficiency Coefficients under Different Football Formations

Formation	OE	DE
4-5-1	0.50	0.70
4-2-3-1	0.60	0.60
4-4-2	0.55	0.55
3-5-2	0.58	0.60
5-3-2	0.45	0.75

3.3.2 Player interaction and collaboration efficiency

Figure 1 shows the differences in team coordination under different formations. The pass success rate of the 4-5-1 formation is 82%, indicating that the midfielder's pass coordination is relatively stable, but the number of key passes is relatively small (10 times), and there is less interaction and coordination between players. This formation mainly relies on the organization and defensive counterattack of the midfield. Therefore, although the defense is stable, there is a lack of sufficient player interaction and smooth coordination on the offensive end. The 4-2-3-1 formation has the highest pass success rate (85%) and a large number of key passes (14 times), indicating that the midfielder's organizational ability and the coordination between players are relatively good. The three attacking midfielders and two defensive midfielders play a key role in the transition between offense and defense, and the team's overall interaction and coordination ability is strong. Although the pass success rate of the 4-4-2 formation reaches 80%, the number of key passes is only 9 times, indicating that its offense has certain limitations. The main task of the midfield is to balance offense and

defense, so there is a lack of more creative player coordination and interaction. The pass success rate and key pass number of the 3-5-2 formation are relatively balanced. Through the cooperation of more players in the midfield and two full-backs, the offense can maintain a high degree of fluidity. The 5-3-2 formation had the lowest pass success rate (75%) among all formations, and the number of key passes was 6. Since the team was more focused on defense and lacked forward support, there was relatively less coordination and interaction between players, and they relied more on defensive counterattacks.

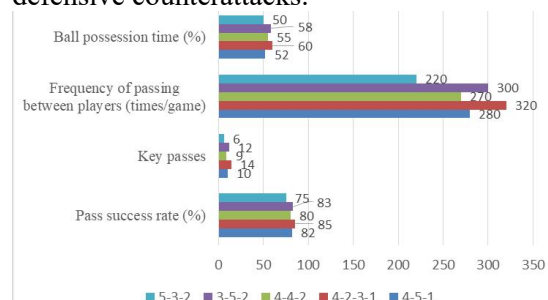


Figure 1. Player Interaction and Collaboration Efficiency in Different Formations

3.3.3 Formation flexibility and adaptability

The flexibility and adaptability of a formation are important factors that determine its tactical effectiveness. Figure 2 shows the frequency of formation changes, success rate of changes and adaptability scores against strong teams.

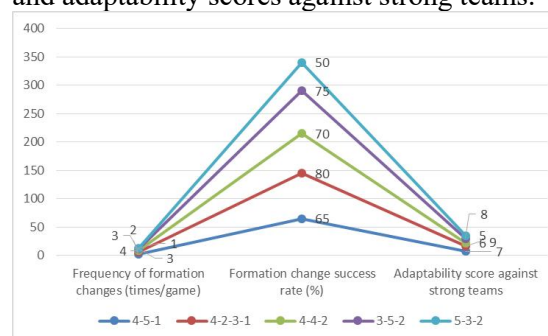


Figure 2. Flexibility and Adaptability Evaluation Chart of the Same Formation

The 4-5-1 formation changes 2 times/game, with a low success rate (65%) and an adaptability score of 7, indicating that its adaptability is limited when facing strong teams. Although its defensive performance is solid, its offensive and defensive transitions are not fast and flexible enough, which limits its adaptability. The 4-2-3-1 formation changes frequently (4 times/game), with a success rate of 80% and an adaptability score of 9,

indicating that it can flexibly adjust its tactics when facing strong teams and is suitable for dealing with ever-changing game situations. The 4-4-2 formation changes in both frequency and success rate (3 times/game, 70%), mainly suitable for more traditional balanced offensive and defensive tactics, and lacks flexibility when facing strong teams. The 3-5-2 formation is suitable for increasing offensive threats through flexible tactical adjustments when facing strong teams, and maintaining a certain degree of tactical flexibility by increasing the participation of midfielders and wingers. The 5-3-2 formation changes the least (1 time/game), and the success rate of changes is also low (50%). The adaptability score is only 5 points. The formation changes are relatively simple, mainly relying on defensive counterattacks, and may not be adaptable enough when facing strong teams.

3.3.4 Players' psychological state and stability of tactical execution

The results in Table 2 reflect the impact of different formations on players' psychological and tactical stability.

Table 2 The Relationship between Players' Psychological State and Tactical Execution Stability Under Different Formations

Formation	Mental state	Tactical execution stability	Players' emotional fluctuations (± 2)
4-5-1	7	8	± 2
4-2-3-1	8	9	± 1
4-4-2	6	7	± 2
3-5-2	7	8	± 1
5-3-2	5	6	± 3

The psychological state score of the 4-5-1 formation is 7, and the tactical execution stability is relatively high (8), indicating that the players can maintain a relatively stable psychological state in this formation. However, because its tactics rely too much on midfield defense and counterattacks, the players' emotions fluctuate greatly (± 2). The 4-2-3-1 formation has efficient attack and defense conversion and strong midfield control ability, which helps players maintain a stable psychological state and reduce tactical execution errors. The psychological state of the 4-4-2 formation is low (6), the tactical execution stability is poor (7), and the players' emotions fluctuate greatly (± 2). Its more

traditional offensive and defensive balanced style may lead to players' lack of sufficient psychological preparation and coping strategies when facing strong opponents. The psychological state of the 3-5-2 formation is relatively stable (7), the tactical execution stability is high (8), and the emotional fluctuation is small (± 1), which is suitable for defensive counterattack tactics. The psychological state score of the 5-3-2 formation is the lowest (5), the tactical execution stability is poor (6), and the players' emotions fluctuate greatly (± 3). Because its tactical style is relatively conservative, players may face greater pressure in the game, resulting in unstable tactical execution.

4. Conclusion

This paper analyzes the application characteristics of skills and tactics under different football formations and finds that each formation shows unique strategies and differences in effect on both offense and defense. Different formations have their own characteristics in the application of skills and tactics. Choosing the right formation and tactical combination is crucial to the team's performance in the game. Among them, formations such as 4-3-3 and 4-2-3-1 are more suitable for ball possession tactics, while formations such as 4-4-2 and 5-3-2 are more suitable for defensive counterattack tactics.

Although this study conducted an in-depth comparative analysis of the application characteristics of skills and tactics under different football formations, there are still some limitations that need to be pointed out, that is, this study mainly relies on existing game data and video analysis, and lacks in-depth discussion of some emerging or uncommon formations, which may lead to an incomplete understanding of some formations and tactical characteristics. Future research can explore the evolution of tactics and selection motivations in different regions and cultural backgrounds through cross-cultural comparison, so as to provide a richer perspective and theoretical support for the development of global football tactics. Through these improvements, The research will be more in-depth and broad, providing stronger support for the theory and practice of football skills and tactics.

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