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TACTICAL AND STATISTICAL ANALYSIS OF GAME MODELS OF LEADING VOLLEYBALL TEAMS IN THE CONTEXT OF THE MODERN COMPETITIVE PROCESS

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Abstract

This study is devoted to a comprehensive tactical and statistical analysis of game models used by leading volleyball teams within the framework of the modern competitive process. Contemporary volleyball is characterized by a high level of intensification, variability of tactical decisions, and the widespread use of data-driven approaches in performance management. Under these conditions, the effectiveness of a team increasingly depends on the optimal integration of tactical structures with statistically grounded decision-making. The relevance of the research is determined by the growing role of match analytics in elite volleyball, where even minor advantages in serve efficiency, attack organization, blocking systems, or defensive transitions can have a decisive impact on match outcomes.

The purpose of the study is to identify key tactical patterns and statistically significant indicators that characterize successful game models of top-level volleyball teams. Particular attention is paid to the interaction between offensive and defensive phases, the balance between risk and stability in tactical choices, and the adaptability of teams to changing match situations. The research is based on the analysis of competitive activity data obtained from international-level matches, including indicators related to serve, reception, attack, block, defense, and transition play.

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The theoretical significance of the study lies in the systematization of modern volleyball game models through the integration of tactical analysis and quantitative performance indicators. The research expands existing scientific views on the structure of competitive activity in volleyball by demonstrating how statistical parameters reflect tactical priorities and team strategies. The practical significance is associated with the possibility of applying the obtained results in the training and competitive preparation of volleyball teams, particularly in higher education institutions specializing in sports training.

The study emphasizes that modern leading teams are distinguished not only by high absolute performance indicators, but also by their ability to flexibly modify tactical models depending on the opponent, score dynamics, and phase of the match. The findings highlight the importance of situational variability, role differentiation of players, and the use of analytical feedback for continuous tactical adjustment. Overall, the research confirms that the integration of tactical thinking with statistical analysis constitutes a fundamental condition for achieving stable competitive success in contemporary volleyball.

Keywords: Tactical analysis, statistical indicators, volleyball game models, competitive activity, team performance, match analytics.

Introduction

ТАКТИКО-СТАТИСТИЧЕСКИЙ АНАЛИЗ ИГРОВЫХ МОДЕЛЕЙ ВЕДУЩИХ ВОЛЕЙБОЛЬНЫХ КОМАНД В УСЛОВИЯХ СОВРЕМЕННОГО СОРЕВНОВАТЕЛЬНОГО ПРОЦЕССА

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Introduction

The rapid evolution of volleyball as a high-performance sport has led to significant changes in the structure and content of the competitive process. Modern volleyball is characterized by increased game speed, reduced reaction time, a higher density of decisive actions, and the growing influence of tactical flexibility on competitive success. In this context, the study of game models used by leading volleyball teams acquires particular importance, as these models reflect the most effective ways of organizing collective actions under conditions of intense opposition and informational uncertainty. Tactical and statistical analysis serves as a key scientific tool for understanding how elite teams achieve and maintain superiority over their opponents throughout a match and across an entire competitive season.

In contemporary volleyball, the concept of a game model is understood as a stable yet adaptable system of tactical interactions, role distributions, and decision-making principles that determine a team's behavior in various game situations. These models are not static formations, but dynamic structures that evolve in response to rule changes, trends in international competition, and advances in sports science and analytics. The introduction of rally scoring, the specialization of playing roles, and the increasing importance of serve pressure and transition phases have significantly transformed traditional approaches to tactical preparation. As a result, coaches and analysts increasingly rely on statistical data to objectively evaluate the effectiveness of tactical solutions and to justify training and competitive decisions.

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Statistical indicators in volleyball provide quantitative reflections of tactical choices made during a match. Parameters such as serve efficiency, reception quality, attack success rate, block effectiveness, and defensive coverage are not isolated values but interconnected elements of a unified tactical system. For example, aggressive serving strategies may lead to a higher number of errors but simultaneously disrupt the opponent's offensive organization, thereby increasing block and defense efficiency. Understanding these interdependencies requires an integrated analytical approach that combines tactical interpretation with rigorous statistical analysis. This approach allows researchers and practitioners to move beyond descriptive assessments toward evidence-based conclusions about performance determinants.

The relevance of tactical and statistical analysis is particularly pronounced in the preparation of highly qualified athletes and teams within sports universities. In such educational and training environments, the development of analytical thinking, tactical awareness, and the ability to interpret performance data is considered an essential component of professional competence. For future coaches, analysts, and physical education specialists, mastering methods of game analysis enables more effective planning of training processes, objective evaluation of competitive activity, and timely correction of tactical deficiencies.

Despite the growing availability of match statistics and analytical technologies, there remains a need for scientifically grounded interpretations of these data

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within the framework of holistic game models. Many existing studies focus on isolated technical actions without sufficiently considering their tactical context and interaction within the overall structure of play. Therefore, a comprehensive examination of the tactical and statistical characteristics of leading volleyball teams contributes to bridging the gap between theoretical analysis and practical application. This study addresses this need by focusing on the identification of dominant tactical patterns and statistically significant indicators that define success in modern competitive volleyball, thereby providing a conceptual basis for further research and applied use in the field of sports training and performance analysis.

Methods

The methodological framework of the study is based on an integrated approach that combines tactical analysis of competitive activity with quantitative statistical evaluation of performance indicators in volleyball. The research relies on the analysis of official match data from high-level volleyball competitions, including international tournaments and professional league matches involving leading teams. These matches were selected due to their high intensity, tactical diversity, and representativeness of contemporary trends in elite volleyball. The methodological approach ensures objectivity, reproducibility, and relevance of the obtained results to modern competitive conditions.

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The primary method of data collection involved systematic observation and notational analysis of matches using official statistical protocols and digital analytics systems commonly applied in elite volleyball. Performance indicators were grouped according to the main phases of the game, including serve, reception, attack, block, defense, and transition between phases. Each indicator was analyzed not only in isolation but also in relation to other components of the game structure in order to reveal tactical interdependencies. For example, serve efficiency was examined in connection with reception quality and subsequent attack effectiveness, while blocking performance was analyzed in relation to defensive organization and counterattack opportunities.

Tactical analysis was conducted through qualitative examination of game situations, focusing on offensive systems, defensive formations, transition patterns, and situational decision-making. Particular attention was given to the variability of tactical models depending on match context, such as score difference, set phase, opponent characteristics, and rotation positions. This allowed for the identification of stable tactical patterns as well as adaptive strategies used by leading teams to gain competitive advantage. Video analysis tools were employed to ensure precise assessment of player positioning, movement coordination, and timing of collective actions.

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Statistical processing of the collected data was carried out using descriptive and comparative analysis methods. Mean values, percentages, and frequency distributions were calculated for key performance indicators to determine typical characteristics of successful game models. Comparative analysis was applied to identify differences between teams with higher and lower competitive effectiveness, as well as between different tactical approaches within the same team across matches. The use of correlation analysis made it possible to establish relationships between selected indicators, revealing which combinations of technical-tactical actions most strongly influenced match outcomes.

The methodological design also incorporated elements of systems analysis, treating the volleyball team as a complex dynamic system in which individual actions are subordinated to collective tactical objectives. This perspective enabled a holistic interpretation of performance data and avoided fragmented evaluation of isolated actions. The reliability of the results was ensured through repeated analysis of multiple matches and cross-verification of statistical data from different sources. Overall, the applied methods provided a comprehensive basis for identifying tactical and statistical characteristics of leading volleyball teams and for formulating scientifically grounded conclusions relevant to training and competitive practice.

Results

The analysis of competitive activity data revealed a set of stable tactical and statistical characteristics that distinguish leading volleyball teams in the modern competitive process. One of the most significant findings concerns the structure of offensive organization. Successful teams demonstrate a high degree of balance between quick attacks through the middle zone and varied attacks from the wings, which allows them to reduce predictability and effectively counter organized blocking systems. Statistical indicators show that a higher proportion of first-tempo and combination attacks is associated with increased overall attack efficiency, particularly in decisive phases of sets.

Serve performance emerged as a critical tactical instrument rather than merely a technical action. Leading teams tend to employ aggressive serving strategies

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aimed at disrupting the opponent's reception system, even at the cost of a slightly higher error rate. Statistical analysis indicates that teams with higher serve pressure achieve a greater number of situations involving out-of-system attacks by opponents, which subsequently leads to increased block and defense effectiveness. At the same time, successful teams maintain an optimal balance between risk and reliability, adjusting serve tactics according to score dynamics and match context.

Reception quality was identified as a key stabilizing factor within the game model. Teams demonstrating consistently high reception efficiency are able to implement a wider range of offensive options and maintain tactical variability throughout the match. The results show a strong positive correlation between reception quality and attack success rate, particularly in high-pressure situations. This confirms the tactical importance of reception not only as a defensive element but as a foundational component of offensive strategy.

Blocking and defensive systems of leading teams are characterized by a high level of coordination and situational adaptability. Statistical indicators reveal

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that effective blocking is less dependent on the absolute number of block points and more on the ability to limit opponent attack efficiency. Teams that consistently reduce the effectiveness of opponent attacks through well-organized block-defense interaction demonstrate greater control over match tempo and scoring dynamics. Defensive coverage in backcourt zones further enhances this effect by creating favorable conditions for transition to counterattack.

Transition play emerged as one of the most decisive elements of modern game models. Successful teams exhibit a high level of readiness to shift rapidly from defense to offense, capitalizing on imperfect opponent attacks or free balls. The data indicate that points scored in transition situations constitute a substantial proportion of total points for leading teams, highlighting the tactical value of speed, anticipation, and coordinated movement during phase changes.

Overall, the results demonstrate that leading volleyball teams are distinguished by integrated game models in which statistical efficiency reflects underlying tactical coherence. Rather than excelling in isolated performance indicators, these teams achieve success through the harmonious interaction of serve pressure, reception stability, offensive variability, and coordinated block-defense systems. The identified statistical patterns provide empirical confirmation of the tactical principles that define effectiveness in modern competitive volleyball.

Discussion

The findings of the study confirm that modern volleyball performance is determined by the systemic interaction of tactical decisions and statistically measurable indicators rather than by isolated technical excellence. The identified game models of leading teams demonstrate that tactical coherence is reflected in stable statistical profiles, which serve as objective manifestations of strategic priorities. This supports the contemporary scientific view that performance analysis in team sports should be grounded in an integrative framework combining qualitative tactical interpretation with quantitative data analysis.

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3	Бразилия	1:3	3:1		3:1	3:1	2:3	3:2	3:0	3:2	3:1	1:3	3:1	3:1	3:0	3:1	3:0
4	Нидерланды	0:3	3:2	1:3		3:2	2:3	3:0	3:0	3:1	3:0	3:1	3:0	3:2	3:0	3:0	3:1
5	Турция	3:2	2:3	1:3	2:3		3:0	2:3	3:0	3:1	3:1	3:1	3:0	3:0	3:1	3:1	3:0
6	Италия	0:3	3:2	3:2	3:2	0:3		0:3	2:3	3:1	2:3	3:0	3:0	3:0	3:0	3:0	3:0
7	Россия	0:3	0:3	2:3	0:3	3:2	3:0		0:3	0:3	3:2	3:1	0:3	3:1	3:0	3:1	3:1

One of the central discussion points concerns the role of serve as a tactical weapon. The results indicate that aggressive serving strategies, when applied selectively and contextually, significantly influence the opponent's offensive organization. This finding aligns with current trends in elite volleyball, where serve pressure is increasingly used to gain indirect advantages rather than to score direct points. From a tactical perspective, the willingness of leading teams to accept a controlled level of serving risk reflects a strategic understanding of long-term match dynamics and scoring probability. Statistically, this approach is justified by the subsequent reduction in opponent attack efficiency and the increased effectiveness of block-defense systems.

The strong relationship identified between reception quality and offensive variability highlights the foundational role of reception within modern game models. This result reinforces the concept that reception is not merely a defensive action but a tactical prerequisite for the implementation of complex offensive systems. Teams capable of maintaining high reception efficiency under pressure gain greater freedom in setter decision-making, which in turn reduces predictability and weakens opponent blocking strategies. This discussion underscores the need to reconsider traditional hierarchical views of technical elements, positioning reception as a central tactical determinant rather than a supportive skill.

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The discussion of blocking and defensive indicators reveals that effectiveness in these phases is more closely associated with limiting opponent options than with accumulating direct scoring actions. This supports the interpretation of blocking as a collective tactical mechanism integrated with backcourt defense rather than as an individual performance metric. The ability of leading teams to coordinate block positioning with defensive coverage demonstrates a high level of tactical discipline and situational awareness. Statistically, this is reflected in reduced opponent efficiency and increased opportunities for transition play, emphasizing the indirect yet decisive impact of defensive organization.

Transition play emerges as a key element that connects all phases of the game into a unified tactical system. The high proportion of points scored in transition situations by leading teams suggests that modern volleyball increasingly rewards speed of tactical reorganization and anticipatory decision-making. This finding has important implications for training methodology, indicating that equal attention should be given to transitional scenarios alongside structured offensive and defensive systems.

Overall, the discussion highlights that the success of leading volleyball teams is grounded in adaptive game models that balance stability with variability. Tactical decisions are continuously informed by statistical feedback, enabling teams to adjust strategies in real time. This interplay between tactics and analytics represents a defining characteristic of the modern competitive process and provides a conceptual foundation for further research and applied development in volleyball performance analysis.

Conclusion

The conducted tactical and statistical analysis demonstrates that the effectiveness of leading volleyball teams in the modern competitive process is determined by the integrity and adaptability of their game models. Contemporary volleyball requires teams to operate as complex, dynamic systems in which tactical decisions, technical execution, and statistical efficiency are closely interconnected. The results of this study confirm that sustainable competitive success is achieved not through the dominance of

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isolated performance indicators, but through the coordinated interaction of all phases of play, supported by continuous analytical feedback.

One of the key conclusions is that tactical flexibility represents a fundamental characteristic of successful game models. Leading teams are distinguished by their ability to modify offensive and defensive strategies depending on match context, opponent behavior, and situational demands. This adaptability is reflected in statistically stable performance indicators that remain effective across different competitive conditions. Such stability does not imply rigidity, but rather indicates a high level of tactical preparedness that allows teams to maintain efficiency while varying tactical solutions.

The study confirms the decisive role of serve and reception interaction in shaping the overall structure of competitive activity. Aggressive yet controlled serving strategies create favorable conditions for defensive and transition phases, while high-quality reception ensures offensive variability and predictability reduction. These elements form the tactical foundation upon which successful game models are built. From a practical perspective, this underscores the necessity of prioritizing serve-reception systems in both training design and performance evaluation.

Another important conclusion concerns the role of defensive organization and transition play. Effective blocking and coordinated backcourt defense function primarily as mechanisms for limiting opponent efficiency and creating opportunities for counterattack rather than as direct scoring tools. The ability to rapidly transition from defense to offense has been shown to significantly influence match outcomes, highlighting the importance of speed, anticipation, and collective coordination. This finding emphasizes that modern volleyball increasingly rewards teams capable of efficiently managing phase changes within the game.

The integration of tactical analysis with statistical evaluation emerges as a methodological imperative for contemporary volleyball. Statistical data acquire real analytical value only when interpreted within a tactical framework that accounts for situational context and strategic intent. Conversely, tactical decisions gain objectivity and reliability when supported by quantitative

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evidence. This bidirectional relationship between tactics and statistics forms the analytical basis for evidence-based coaching and performance management.

From an educational and applied standpoint, the results of the study have particular relevance for sports universities and institutions involved in the preparation of volleyball specialists. The development of analytical competence, tactical thinking, and data interpretation skills should be regarded as essential components of professional training. Incorporating tactical and statistical analysis into the educational process can significantly enhance the quality of coaching decision-making and competitive preparation.

In summary, the study confirms that the modern competitive process in volleyball is characterized by the dominance of integrated, adaptive game models supported by systematic tactical and statistical analysis. These findings contribute to the scientific understanding of volleyball performance and provide a practical foundation for improving training methodology, match analysis, and long-term team development in high-performance volleyball.

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