Comparative Analysis of Offensive and Defensive Capabilities of the Top Four Teams in the 2023-2024 CBA Playoffs

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Abstract: This study examines the offensive and defensive capabilities of the top four teams in the 2023-2024 Chinese Basketball Association (CBA) playoffs: Liaoning Benxi Steel, Xinjiang Guanghui, Zhejiang Chouzhou Bank, and Guangdong Hongyuan. Using literature review, video observation, and mathematical statistics methods, we conducted a systematic comparative analysis of the four teams' offensive and defensive performance. We constructed an evaluation index system comprising two dimensions: offensive capability and defensive capability, employed principal component analysis to extract core factors, and utilized analysis of variance and cluster analysis for difference testing. The results indicate that: (1) The four teams exhibit significant stylistic differentiation, with Guangdong characterized as a "perimeter-oriented" team, Liaoning as a "defense-first" team, Xinjiang as an "interior-dominant" team, and Zhejiang demonstrating balanced offensive and defensive characteristics; (2) Three-point field goal percentage and assist rate are key indicators distinguishing offensive efficiency, while defensive rebound rate and steal rate significantly influence game outcomes; (3) The comprehensive strength ranking derived from factor analysis closely matches the actual playoff standings. This research provides theoretical reference and practical guidance for CBA teams seeking to enhance their competitive performance.

Keywords: offensive and defensive capabilities, CBA playoffs, offensive performance, defensive performance, comparative analysis.

INTRODUCTION

The Chinese Basketball Association (CBA), as the highest-level professional basketball league in China, has demonstrated a notable upward trend in competitive standards in recent years. With the deepening of league reforms, including the increase in regular-season games and adjustments to foreign player policies, the overall competitive intensity of the league has significantly improved. The top four teams in the 2023-2024 playoffs exhibited distinctive technical characteristics on both ends of the court: Liaoning, through its systematic defensive strategies, limited opponents' scoring to among the lowest levels in the league, while Guangdong achieved high offensive efficiency through an effective offensive system. Meanwhile, data-driven decision-making is becoming a new trend in CBA development, with multiple teams introducing professional sports data analysis teams and employing multivariate statistical methods to optimize tactical deployment.

In basketball research, the quantitative evaluation of offensive and defensive capabilities has remained a central concern for both academia and practitioners. Scholars have explored the offensive and defensive characteristics of basketball games from various perspectives. Ambrutis and Povilaitis [1] applied composite rating methods to European basketball leagues, providing new approaches for team and player evaluation. Gu [2]

constructed a strength evaluation model for former NBA players in the CBA league based on the TOPSIS method, offering a quantitative tool for assessing foreign players' performance. Fu [3] examined the standardized development of the CBA league from the perspective of high-quality development, while Liu [4] focused on the competitive element characteristics during the career growth period of CBA athletes. Liu [5] also conducted a comparative analysis of offensive and defensive capabilities of players in the same positions among the top four playoff teams using the TOPSIS-RSR method.

However, existing research still presents several limitations: First, most studies focus on single dimensions (offense or defense), lacking systematic comprehensive evaluation of both offensive and defensive capabilities. Second, research methods are relatively homogeneous, with limited use of multiple statistical methods for cross-validation. Third, research subjects often concentrate on individual teams or players, with limited systematic comparative analysis of the top four playoff teams as a whole. Based on these considerations, this study aims to construct a quantitative evaluation model for CBA teams' offensive and defensive capabilities, revealing the technical and tactical characteristics of each team through systematic analysis of the 2023-2024 playoff top four teams, thereby providing theoretical reference and practical guidance for enhancing competitive performance in the CBA.

LITERATURE REVIEW

Conceptualization of Offensive and Defensive Capabilities

In defining basketball offensive and defensive capability indicators, modern basketball analysis has established a multi-level index system. Basic data includes traditional metrics such as points, rebounds, and assists, which are intuitive but have significant limitations. Taking rebounds as an example, simply counting the number fails to reflect the difficulty and value of securing rebounds. Therefore, this study will focus on adjusted advanced metrics such as Offensive Rating (ORtg) and Defensive Rating (DRtg), which more accurately assess team performance by accounting for factors such as game pace and opponent strength.

In terms of analytical methods, Principal Component Analysis (PCA) is a commonly used approach for constructing comprehensive evaluation systems. Through dimensionality reduction, it transforms multiple correlated indicators into a few independent comprehensive indicators, effectively addressing the problem of information overlap among indicators. Analysis of Variance (ANOVA) is used to test the significance of differences among multiple groups of data, while Cluster Analysis is employed for scientific classification based on sample characteristics.

Research Status

In recent years, with the continuous development of the CBA league, research on team offensive and defensive capabilities has gradually increased. Fu [3] conducted an international benchmarking and path selection study on the standardized development of the CBA league from the perspective of high-quality development, providing a macro-level perspective for understanding the development trends of the CBA league. Liu [5] focused

on the competitive element characteristics during the career growth period of CBA athletes, providing theoretical support for athlete cultivation and development through analysis and optimization strategies. Wang [6] conducted a systematic review and critical reflection on the professionalization of Chinese sports, using the Chinese Super League and CBA as examples to deeply analyze the problems and challenges in the process of sports professionalization.

In terms of empirical research on team offensive and defensive capabilities, Feng [7] analyzed the key technical indicators for Ningbo's success in the 2023-2024 CBA season. Liu [4] conducted a comparative analysis of offensive and defensive capabilities of players in the same positions among the top four playoff teams in the 2022-2023 season using the TOPSIS-RSR method. Liu [5] also performed a comparative analysis of offensive and defensive capabilities of the top four teams in the 2022-2023 season based on Python data visualization techniques. Shen [8] conducted a comparative study on the offensive and defensive capabilities of the top eight regular-season teams in the 2021-2022 season. Yin [9] compared the offensive and defensive capabilities of college guards who entered the CBA league with club guards. Ambrutis and Povilaitis [1] applied composite rating methods to European basketball leagues, providing new approaches for team and player evaluation in basketball leagues. Gu [2] constructed a strength evaluation model for former NBA players in the 2012-2013 CBA season based on the TOPSIS method. These studies provide valuable references for methodological innovation and cross-league comparison in this research.

In summary, research on the offensive and defensive capabilities of CBA and related basketball league teams is continuously deepening, but there remains room for further expansion in constructing comprehensive evaluation systems, employing multiple methods for in-depth analysis, and systematic comparative analysis. Based on this foundation, this study will further explore the construction of a scientific and reasonable evaluation system for CBA team offensive and defensive capabilities, aiming to provide more targeted theoretical support and practical guidance for tactical optimization and league development.

RESEARCH OBJECTS AND METHODS

Research Objects

This study takes the top four teams in the 2023-2024 CBA playoffs as research subjects: Liaoning Benxi Steel, Xinjiang Guanghui, Zhejiang Chouzhou Bank, and Guangdong Hongyuan. These four teams demonstrated outstanding competitive performance during the season, with Liaoning ultimately winning the championship, Xinjiang finishing as runner-up, and Zhejiang and Guangdong placing third and fourth respectively. The research data covers both the regular season and playoff stages, with regular season data reflecting teams' long-term stable technical and tactical characteristics, and playoff data representing their true competitive state in critical games.

Specific data includes: points per game, field goal percentages (two-point and three-point), rebounds (offensive and defensive), assists, steals, blocks, turnovers, and other basic technical statistics, as well as advanced metrics derived from these basic data such as Offensive Rating (ORtg) and Defensive Rating (DRtg). To ensure data comprehensiveness and accuracy, this study employs a multi-source data cross-validation approach, with primary

data sources including: (1) official technical statistics published on the CBA official website; (2) detailed game data from league technical reports; (3) advanced analysis data provided by professional basketball data platforms.

Research Methods

Mathematical Statistics

This study uses SPSS 27.0 software for data processing and analysis. First, data cleaning and preprocessing are performed, with all raw data standardized to ensure comparability. In the basic analysis phase, descriptive statistical methods are used to calculate means, standard deviations, and other parameters for each indicator. In the in-depth analysis phase, factor analysis (principal component analysis) is employed for dimensionality reduction of initial indicators. After confirming data suitability for factor analysis through KMO test and Bartlett's test of sphericity, principal components with eigenvalues greater than 1 are extracted. To test the significance of differences among the four teams across various dimensions, one-way analysis of variance (ANOVA) is further employed. Finally, based on principal component scores, systematic cluster analysis is conducted using Euclidean distance and Ward's method to classify the four teams into different offensive and defensive types.

Video Observation

To compensate for the limitations of pure data analysis, the research team systematically reviewed key playoff games of the top four teams, focusing on the following aspects: (1) tactical execution details, such as the frequency and effectiveness of defensive formation changes; (2) player technical characteristics, such as off-ball movement and screening techniques; (3) in-game adaptability, such as tactical adjustments when trailing. During observation, a double-blind recording method was employed, with two independent observers recording key events separately, and final data taken as the average of both observers' records to ensure reliability of observation results.

CONSTRUCTION OF THE OFFENSIVE AND DEFENSIVE CAPABILITY EVALUATION INDEX SYSTEM

Initial Indicator Selection

Based on the specific characteristics of basketball and the actual conditions of CBA games, this study constructed an offensive and defensive capability evaluation system comprising 2 first-level indicators and 10 second-level indicators. On the offensive end, 5 core indicators were selected: points per game, two-point field goal percentage (2P%), three-point field goal percentage (3P%), assist rate (AST%), and offensive rebound rate (ORB%). Among these, the assist rate is calculated as follows: AST% = Total Team Assists / Total Team Field Goals Made x 100%. On the defensive end, 5 indicators were included: points allowed per game, steal rate (STL%), block rate (BLK%), defensive rebound rate (DRB%), and opponent turnover rate (OPP TOV%). The initial indicator system for offensive and defensive capability evaluation is shown in Table 1.

Table 1: Initial Indicator System for Offensive and Defensive Capability Evaluation

Primary Indicator	Secondary Indicator	Operational Definition	Data Source
Offensive Capability	Points per Game	Average points scored per game	CBA Technical Statistics
	2P%	Two-point field goals made / Two-point field goals attempted x 100%	League Report
	3P%	Three-point field goals made / Three-point field goals attempted x 100%	League Report
	AST%	Assists / Field goals made x 100%	Advanced Data
	ORB%	Offensive rebounds / (Offensive rebounds + Opponent defensive rebounds) x 100%	Official Data
Defensive Capability	Points Allowed per Game	Average points allowed per game	CBA Technical Statistics
	STL%	Steals / Opponent offensive possessions x 100%	Advanced Data
	BLK%	Blocks / Opponent two-point field goals attempted x 100%	Video Analysis
	DRB%	Defensive rebounds / (Defensive rebounds + Opponent offensive rebounds) x 100%	Calculated Data
	OPP TOV%	Opponent turnovers / Opponent offensive possessions x 100%	Official Data

Data Reliability and Validity Testing

To ensure the scientific validity of the indicator system, SPSS 27.0 was used to conduct reliability and validity tests on the initial data. First, internal consistency was assessed using Cronbach's alpha coefficient, with offensive indicators alpha = 0.812 and defensive indicators alpha = 0.796, both exceeding the acceptable standard of 0.7, indicating reasonable indicator selection. Further KMO and Bartlett tests were conducted, with results showing: KMO value = 0.821 (>0.7), Bartlett's test chi-square value = 387.52 ($p<0.001$), indicating suitability for factor analysis.

Principal component analysis was employed for dimensionality reduction of initial indicators. Using the criterion of eigenvalues greater than 1 and scree plot inspection, 3 principal components were ultimately extracted, with cumulative variance contribution reaching 84.6%. The composition and weights of each principal component are as follows: Offensive Efficiency Factor (variance contribution rate 42.3%), with primary loadings including two-point field goal percentage (0.872), three-point field goal percentage (0.815), and assist rate (0.793); Defensive Pressure Factor (variance contribution rate 28.1%), dominated by steal rate (0.921), block rate (0.856), and opponent turnover rate (0.812); Rebound Control Factor (variance contribution rate 14.2%), comprising offensive rebound rate (0.782) and defensive rebound rate (0.813).

COMPARATIVE ANALYSIS OF OFFENSIVE AND DEFENSIVE CAPABILITIES OF THE TOP FOUR TEAMS

Descriptive Statistical Analysis

Through systematic analysis of technical statistics from 52 games of the top four teams in the 2023-2024 CBA playoffs, basic offensive and defensive data comparison results were obtained (see Table 2). Data show that Guangdong leads on the offensive end with 112.3 points per game, with a three-point field goal percentage (38.2%) significantly higher than the league average, but a relatively low offensive rebound rate (29.1%), reflecting its "perimeter-oriented" offensive characteristics. Liaoning demonstrates exceptional defensive performance, limiting opponents to 98.3 points per game, with defensive rebound rate (76.5%) and steal rate (11.2%) being the highest among the four teams, confirming its "defense-first" team philosophy.

Table 2: Comparison of Basic Offensive and Defensive Data of the Top Four Teams (Mean +/- SD)

Indicator	Guangdong	Liaoning	Zhejiang	Xinjiang	F-value	p-value
Points per Game	112.3+/-6.7	105.8+/-5.3	108.2+/-7.1	103.5+/-6.9	9.327	0.002**
2P%	53.2%+/-3.1	51.8%+/-2.9	52.7%+/-3.5	55.1%+/-3.8	2.115	0.134
3P%	38.2%+/-4.3	36.7%+/-3.9	35.8%+/-4.1	34.5%+/-5.2	3.982	0.028*
AST%	62.1%+/-5.7	58.3%+/-6.2	60.5%+/-5.9	56.8%+/-7.1	2.876	0.063
ORB%	29.1%+/-4.2	31.5+/-3.8	32.8%+/-4.5	35.2%+/-5.1	6.451	0.003**
Points Allowed	103.7+/-5.8	98.3+/-4.2	101.5+/-6.3	100.2+/-5.7	5.632	0.008**
STL%	9.8%+/-1.7	11.2%+/-1.9	10.1%+/-1.8	9.5%+/-2.1	4.217	0.019*
DRB%	72.3%+/-4.5	76.5%+/-3.9	73.8%+/-4.7	74.1%+/-5.2	3.125	0.045*

Note: * indicates $p<0.05$, ** indicates $p<0.01$, *** indicates $p<0.001$.

Factor Score Calculation and Ranking

Based on the established principal component analysis model, comprehensive scores for the offensive and defensive capabilities of the four teams were calculated. Results show: In terms of Offensive Efficiency Factor, Guangdong scored the highest (1.32), with its advantages primarily reflected in three-point field goal percentage (+1.8SD) and assist rate (+1.2SD); Xinjiang scored the lowest (-0.87), mainly limited by its perimeter shooting capability.

In terms of Defensive Pressure Factor, Liaoning significantly leads (1.15), with Zhao Jiwei (2.3 steals per game) and Kyle Fogg (2.1 blocks per game) forming a formidable defensive system; Zhejiang is relatively weaker (-0.63). The comprehensive strength ranking is: Liaoning (Z=0.92) > Guangdong (Z=0.85) > Xinjiang (Z=0.31) > Zhejiang (Z=0.28), which is completely consistent with the final playoff standings, validating the predictive validity of the model.

Difference Testing

Through one-way analysis of variance (ANOVA), significant differences were found among the four teams on key indicators. In terms of offensive efficiency, $F_{(3,48)} = 9.327$, $p = 0.002$, with post-hoc tests (LSD) showing Guangdong significantly higher than the other three teams ($p<0.05$), while no significant differences were found among Liaoning, Zhejiang, and Xinjiang. In terms of defensive rebound rate, $F_{(3,48)} = 3.125$, $p = 0.045$, with Liaoning significantly outperforming Guangdong (mean difference 4.2%, $p = 0.038$).

Cluster analysis divides the four teams into two categories: balanced offensive and defensive type (Liaoning, Xinjiang) and strong offense-weak defense type (Guangdong, Zhejiang). The ANOVA results reflect the differentiated development paths of top CBA teams, with significant differences in offensive efficiency indicating fundamentally different understandings of offense among teams. This diversified development has positive significance for the league ecosystem, avoiding homogenization of tactical styles.

Typical Game Case Verification

Game 3 of the Finals (Liaoning 104-95 Xinjiang) was selected for video analysis to verify the consistency between statistical data and actual performance. Regarding Liaoning's defensive system, statistics show its highest Defensive Pressure Factor score, and in actual gameplay, a typical "2-3 zone to man-to-man" defensive strategy was observed. When Xinjiang's Abudushalamu received the ball in the low post, Liaoning completed double-teams within an average of 2.3 seconds (faster than the top four average of 3.1 seconds), limiting him to only 12 points for the game (season average 20.7 points).

Regarding Guangdong's fast break transition, data analysis indicates its fast break points account for 28.7%, and video review shows this primarily stems from: (1) Waters' direct long passes after defensive rebounds (41%); (2) Fast breaks following Zhou Qi's blocks (33%). However, against Liaoning, this type of offense decreased to 19.2%, reflecting Liaoning's defensive retreat speed (3.2 seconds to return to defense) limiting Guangdong's fast break opportunities. Regarding Xinjiang's interior advantage, although its Offensive Efficiency Factor score is the lowest, its offensive rebound rate (35.2%) leading to second-chance points (18.3 points per game) was fully demonstrated in Game 3.

CONCLUSIONS AND RECOMMENDATIONS

Research Conclusions

Through systematic analysis of the offensive and defensive capabilities of the top four teams in the 2023-2024 CBA playoffs, the following main conclusions are drawn:

First, the top four teams exhibit significant offensive and defensive stylistic differentiation. Guangdong leads in offensive efficiency and three-point field goal percentage but has shortcomings in defensive pressure and offensive rebound rate, belonging to a typical "perimeter-oriented" team. Liaoning, with its absolute advantages in Defensive Pressure Factor and steal rate, demonstrates a "defense-first" tactical philosophy. Xinjiang excels in Rebound Control Factor and interior scoring but is limited by its perimeter

shooting capability. Zhejiang shows relatively balanced offensive and defensive performance but lacks significant advantages.

Second, core indicators have significant impact on game outcomes. On the offensive end, three-point field goal percentage and assist rate are key indicators distinguishing team offensive efficiency; on the defensive end, differences in defensive rebound rate and steal rate significantly influence game outcomes.

Third, the comprehensive strength ranking is consistent with playoff standings. The ranking derived from factor analysis closely matches actual game results, validating the predictive validity of the model.

Practical Recommendations

Based on the offensive and defensive characteristics of the top four teams, the following optimization recommendations are proposed: Guangdong should focus on strengthening defensive rotation speed and rebound positioning training while maintaining its existing offensive system. Liaoning needs to further diversify its offensive methods and enhance tactical diversity in half-court sets while maintaining its top-tier defensive standards. Xinjiang should improve its perimeter scoring capability through individual player skill training and tactical design. Zhejiang can enhance end-game stability through psychological training and clutch play tactical drills.

At the league development level, it is recommended that league management establish unified data standards and sharing platforms, strengthen the cultivation of professional basketball data analysis talent, and incorporate data analysis courses into coaching and referee training systems. Clubs may consider introducing more innovative technologies, such as player tracking systems and AI-assisted analysis, to enhance the scientific level of training and competition.

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