A Research on Development and Application of the Evaluation Software
Analyzing and Evaluating the Effects of Competitive Basketball Athletes’
Tactics

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Abstract: On the basis of the analyzing the effects of tactics used by both domestic and foreign
competitive basketball athletes, this paper designs a software based on the system evaluation
indicators, through which, the real-time tracking and grading of each athlete’s tactic application and
of tactical parameters could be achieved, so that we could have a prompt and direct understanding
and analysis of the forms of the athletes on the field. At the same time, this software could also help
the coach to make systematic analysis and evaluation of the individual’s and the team’s
performance, which could be used as objective data director for training and competitions.

Introduction

In a basketball game, the integrated cooperation of a team and the personal abilities of athletes
affect the competitive level of a team, however, it is always the personal abilities of the athletes that
determine the winning of a team. Thus, how to obtain and analyze as much information as possible
reflected in every single game becomes vital for the coach to improve the overall attack and defense
ability of the team [1]. On the other hand, every competitive event has its own tactics. To master the
advanced tactics is an important way to develop the competitive ability and make good scores.
Although deep researches in various aspects of the basketball tactics have been made overtime,
leading to a deepening and extension of this field, however, there still remains a gap between the
research and the practice. Researches show that the statistics of the effects of the tactics used by
athletes during the game can greatly promote the performance of athletes. Through the objective
analysis and statistics accumulating of the tactics used by athletes during the game, the coach could
lead specific trainings to athletes, fans could treat a game more objective and the media could also
find more attractive points for the audience, while at the same time the game could become more
interesting to watch. The tactical statistics are the most direct and genuine reflection of a basketball
game, an indispensable part closely connected to the practice. However, the statistics analysis of our
country is still at the initial stage. How to accumulate statistics and analyze the tactics applied in the
game objectively and scientifically has become a bottleneck for the improvement of the tactics of
athletes and coaches [2].

With the development of the computer technology, the accumulating and analyzing of technical
statistics have become simple and practicable. Moreover, the development of the tactical statistics
analysis software and the theory of which have made it possible for the games to become more
competitive and more intense. The point of technical statistics analysis is to change the meaningless
data into important information for athletes and coaches. However, the regular statistics only
focused on the surface data of the scores winning and fouls making, in which the data of offensive
rebound and defensive rebound can be misleading. This thesis intends to establish an evaluation
index system through statistical analysis of basketball games. Then it makes research and
development of the application software for statistical analysis by computer programming, so that
the significance of the statistics accumulated through the games could be revealed and thus provide
objective references to the coaches for designing and implementing specific training plans.
Literature Review

To construct a complete and scientific statistical evaluation index system of basketball tactics application is an intrinsic requirement of the development of the basketball games. In his research of the construction of the system for statistical analysis of basketball game tactics in 2008, Shan Shuguang made investigations from eight perspectives including shoot, score, rebound, loss, efficiency of attack and defense, line-up combination, critical moment performance and the goal accomplishment based on the times of attack and defense transition and made the first tactic statistics specification of CBA tournament [3]. The specification not only elaborates on the criterion of the statistical indicators during the game including field goal, rebound, free throw, turnover, assist, steal, block shot, defend and the players playing time, but also defined the complicated situation of statistics by identifying the indicators, explaining statistical principles and several cases. Moreover, it guarantees the comprehensiveness and balance of the tactic statistics from three aspects including the specification of the basic ideas, the test of the statistics’ accuracy and the problems which need to be illustrated, and enriched the system of the statistical analysis of tactics used in basketball games of our country. In his 2011 research of the regression analysis of the athletes’ tactical indicators and efficiency value in 2010-2011 NBA season, Ye Songzhong analyzed 11 tactical indicators of the athletes by adopting regressive analysis [7]. The research finds that the sequence of the factors which might influence the efficiency value of the athletes are score, turnover, rebound, assist and dunk. And it explains the relationship between the efficiency value of the athletes and the tactical indicators by adopting regressive equations. Ye’s research is a useful complement of Shan’s. The previous studies have offered inspirations for the establishment of the parameters in the indicator system of basketball tactics in this research.

In the field of accumulating statistics and discovering basketball game abilities as well as software development, the research of our country is still at the initial stage [6]. The current software designed for the statistics of basketball game tactics is small in number and insufficient in several aspects including difficulties of data entry, complexity of operation and incapability of analyzing the real-time data already recorded. On the other hand, although the famous foreign software of basketball game statistics can provide comprehensive functions and the data analysis of which is also in accordance with the competitive characteristics of the basketball games, the software is designed according to the western cultural and operational habits, which could be a barrier for the acceptance of it in our country. In the existing research, Pan Deng developed a system evaluating the abilities of the basketball athletes in his thesis—the evaluation and software development of the basketball athletes’ abilities [4]. The application of this system can simplify the statistics accumulation and comprehensive evaluation of the tactical parameters in the basketball game, which leads to a more scientific and direct assessment of the athletes’ comprehensive qualities and abilities. Thus, the management efficiency could be enhanced and better performance could be achieved in the competitions. The software they developed adopted the Delphi 7.0 as the development tool of the user-interface and achieved corresponding data operation and management through the connection between ODBC interface and Access 2000 background database. However, their software is not very convenient in actual use since it is a stand-alone version. Moreover, their research merely evaluates the competition abilities of the athletes by accumulating statistics during the games, but is incapable of evaluating the application abilities in single event from the perspective of tactics.

Above all, we believe that it is feasible for the competition tactics of basketball athletes to be digitized. In the meantime, the computer management should be introduced to the basketball field and used to gather information and accumulate application abilities of the athletes in a more scientific, comprehensive, fast, accurate and just way by adopting professional evaluation systems. Through conversion of tactic applications, the quantization of the athletes’ performance can be achieved.

The modern information technology, especially information technology based on the platform of computers, has made remarkable achievements. The evaluation system running on the computer makes the combination between scientific analysis of data and the information technology come
true and thus achieves efficient management and evaluation. The major function of this system is to track and evaluate the real-time tactic application and tactical parameters of the athletes so that the performance of the athletes could be grasped quickly and directly. The detailed statistics of the athletes could also ensure the scientific and just selection of excellent team players. The system developed by this paper can assist the coach not only to make systematic analysis and objective evaluation for individual athletes as well as the whole team, but also to have a comprehensive understanding of the opponents, which could serve as guidance for the future trainings and competitions.

Research Method

Documentary Method

The paper determines the indicator system of the basketball game tactics through articles, periodicals and books from CNKI database and the library of Xi’an Institute of Physical Education. The construction of the indicator system mainly used the doctoral thesis written by Shan Shuguang from Beijing Sport University as a reference [5]. Based on the “Unification of CBA tactic statistical measurement”, and draws lessons from The “FIBA Technical Statistics Manual”, “American NC Handbook of technical statistics”, “Handbook of technical statistics for the European Basketball League” and “Technical statistics Handbook of Russian Basketball League”[8,9,10,11], the paper formulates the first specification of tactic statistics of CBA and elaborates on the criterion of score, rebound, penalty shot, loss, assist, steal, block shot, defense, playing time, etc.

Expert Interview

The research has been made by interviewing coaches and experts of basketball majors or clubs in an objective, planned and specific manner, so that the actual situation and importance of the evaluation and analysis system application in the basketball games can be understood. In the meantime, the reliability and feasibility of the tactical system application can be verified.

Observational Method

Through the observation of every athlete’s performances in several matches, the paper accumulates the parameters of tactic application.

Mathematical Statistics

The paper accumulates, analyzes and processes the parameters acquired by employing Excel 2003 and SPSS17.0 and constructs the statistical model of the parameters in the indicator system. The gathering of the indicators according to actual needs provide convenience for the research and analysis of this thesis.

Research Results and Analysis

Characteristics of the Software

Convenience and Efficiency of System Inquiry

Firstly, the system has adopted the popular visible control object—jquery-UI1.0, with which adding and modifying can be easily achieved on the pop-up dialog. Secondly, it has employed the lightweight js plug-in—jquery, so that code editing can become more convenient, efficient, easy to read and fast in running speed, in the meantime, the processing of asynchronous can also become available.

Advancement

Firstly, the structure and the development tool of the system should be advanced and easily to be upgraded. Secondly, the openness and expansibility are required. Thirdly, the system employs the
popular control displaying list—jquery-ui and part of the form and provides asynchronous processing.

**Usability and Maintainability**

Firstly, nice user interface and human-machine interface are provided. Terms and Chinese interface that the users are familiar with are adopted. Secondly, the design of the system has adopted the three-layer model of struts2+spring3.4+jdbc so that the distinction among the show layer, business layer and processing layer becomes clearer and the maintainability is also improved.

**Standard of the System**

In the process of development and employment of the system, the computer hardware and software related should all comply with the mainstream international, national and industrial standards. For example, the operational system, the network system as well as the development tool should all comply with the general standards; the database operation interface should be regulated to the TCP/IP networking protocol and the ISO9002 standards. In the meantime, as we are developing the system independently, we should guarantee the good design, feasible software engineering regulations and readability, operability and portability of the code.

**Software Development and the Environment**

Software Environment:
(1) Operating system: Windows, Linux
(2) Database: MySQL Server 5.0
(3) Web Container: Tomcat 6.0X [3], JDK 1.6 or higher version

Hardware Environment:
(1) Processor: P3, or more advanced PC, independent Application Server is recommended
(2) Internal Storage: 258MB or higher
(3) Disk Size: 518MB or higher
(4) Others: mouse, keyboard

**Overall Framework of the software**

The software has adopted the multi-layer non-distributed framework. The division of the layers, tactics adopted in every layer and the corresponding framework are shown in figure one, with all of the layers kept in the same Web container. The main characteristics of this form are:

(1) Following the main principles of Sun J2EE: multi-layer architecture and loose coupling.

The software has adopted the hierarchical structure, one in which different modules are being packaged separately and relationships among each layers are weak, so that loose coupling is kept and the whole system has a high stability and is easy to be expanded and maintained.

(2) By adopting dependency injection “Spring”, the system has improved its expansibility and maintainability.
Conclusion

The overall development of the software makes it possible to evaluate the tactic application and tactical parameters of the athletes under rational and effective indicator systems, so that the coach can have a prompt and direct understanding of the athlete’s tactic application, which could be used as a reference for later training and competitions. The software of evaluation indicator system developed in this thesis can also be utilized in other sport events for tactic application evaluation of other athletes.

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References


