Teaming Strategies in Football: Patterns and Effects

Objective analysis of the football team's performance is the main way to set training targets, and improve the team's level. Existing analysis of team performance is mostly based on the traditional technical statistics of individual athletes, but seldom discusses the important role*s* of the interrelationships and synergies between athletes. In view of this, this paper adopts the perspective of players' cooperation network, constructs the analysis framework of "identifying cooperation network–expanding cooperation model-exploring influence effect–putting forward suggestions", quantitatively analyzes the cooperation relationship of Huskies football team and its influence law on competition performance. We have mainly solved the following four problems:

Firstly, in order to identify the cooperation network, this paper constructs a **complex network** model based on **directional weighted graph** based on the characteristics and data of passing the ball. This paper constructs cooperation network indicators and other structural indicators from multiple scales. We refer to gene coding types to distinguish binary and ternary structures, use the simulation chart of competition field to mine the team formation rules, and adopt heterogeneity analysis to explore the relationship between individual players and the team, as well as the change rules of different network indicators with time.

Secondly, in order to measure team cooperation performance more comprehensively, this paper constructs a **comprehensive evaluation index system** by integrating Individual contributions to the team, Team structure, Strategic layout, Environment variables and 13 sub-indicators. Among them, in order to make clear the Individual contribution to the team, this paper combines subjective and objective weights, uses **AHP and entropy weight** to construct a sub-model of player scoring.

Thirdly, we research the mechanism where team strategy and other factors affect victory. For heterogeneity analysis, we build **multi-classification undirected logistic regression** models from two levels, winning and losing situations and score results to distinguish team formations. We also deal with multiple collinearity and other issues. The results show that Huskies is suitable to adopt an attack-defense balanced formation and a right-wing attack style, and it is more effective to adopt counter-strategies appropriately according to the opponent's situation.

Fourthly, according to Huskies' network structure and relevant research conclusions, it is believed that the overall framework and contingency mechanisms, individual and collective factors, subjective and objective factors, long-term and short-term situations should be considered in order to form an excellent football team. Extended to other types of teams, other factors such as leadership, gender composition and team culture should be considered as well.

To sum up, the advantages of this paper are as follows: (1)**Pertinence**：choose statistical indicators and models that can better reflect the characteristics of football matches and player networks; (2)**Clear hierarchy**：make different analysis and comparison from the angles of attack style, team formation, sample range and consider the outcome of the match; (3)**Reliability**: use robust analysis method and multiple tests; (4)**Extensibility**: put forward practical suggestions to the football team and even the broader competition team.

Key words: Team Strategy, Football, Network Science, Logistic Regre