## Ranking Theory-The Paradigm Shift in Statistical Approach to the Issue of Ranking in a Sports League

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Abstract : The issue of ranking of sports teams, in particular soccer teams is of primary importance in the professional sports. However, it is still based on classical statistics and models outside of area of mathematics. Rigorous mathematics and then statistics despite the expectation held of them have not been able to effectively engage in the issue of ranking. It is something that requires serious pathology. The purpose of this study is to change the approach to get closer to mathematics proper for using in the ranking. We recommend using theoretical mathematics as a good option because it can hermeneutically obtain the theoretical concepts and criteria needful for the ranking from everyday language of a League. We have proposed a framework that puts the issue of ranking into a new space that we have applied in soccer as a case study. This is an experimental and theoretical study on the issue of ranking in a professional soccer league based on theoretical mathematics, followed by theoretical statistics. First, we showed the theoretical definition of constant number  $\varepsilon = 1.33$  or 'golden number' of a soccer league. Then, we have defined the 'efficiency of a team' by this number and formula of  $\mu = (Pts / (k.\varepsilon)) - 1$ , in which Pts is a point obtained by a team in k number of games played. Moreover, K.E index has been used to show the theoretical median line in the league table and to compare top teams and bottom teams. Theoretical coefficient of  $\sigma = 1 / (1 + (Ptx / Ptxn))$  has also been defined that in every match between the teams x, xn, with respect to the ability of a team and the points of both of them Ptx, Ptxn, and it gives a performance point resulting in a special ranking for the League. And it has been useful particularly in evaluating the performance of weaker teams. The current theory has been examined for the statistical data of 4 major European Leagues during the period of 1998-2014. Results of this study showed that the issue of ranking is dependent on appropriate theoretical indicators of a League. These indicators allowed us to find different forms of ranking of teams in a league including the 'special table' of a league. Furthermore, on this basis the issue of a record of team has been revised and amended. In addition, the theory of ranking can be used to compare and classify the different leagues and tournaments. Experimental results obtained from archival statistics of major professional leagues in the world in the past two decades have confirmed the theory. This topic introduces a new theory for ranking of a soccer league. Moreover, this theory can be used to compare different leagues and tournaments.

Keywords : efficiency of a team, ranking, special table, theoretical mathematic

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