

FIFA Ranking and World Cup Football Groups: Quantitative Methods for a Fairer System

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Abstract The team seeding and final group distributions for the final tournament of the 2014 World Cup football competition have provoked serious criticism in the international football community. Much of the discontent has been directed at the formula underlying the FIFA ranking used to designate the 8 seeded teams. Particularly surprising for many in the football world

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was that the seeds include national sides like Colombia and Switzerland while undisputed powerhouses such as Italy and Holland were left out.

Another focus of negative comment in sports media around the world is the heavily geographical criteria used by FIFA to determine the makeup of the 4 "pots" for the draw procedure that defined the composition of the team groups. Such criteria tend to result in groups that are highly uneven, and this is clearly reflected in the 2014 World Cup assignments. While one group contains football powers Uruguay, Italy and England and a second group includes Spain, Holland and Chile, others are globally much weaker such as the one lumping third-seeded Argentina in with Bosnia, Iran and Nigeria, three countries with relatively little football tradition.

This study has two principal goals. The first is to make a series of adjustments to the current FIFA ranking formula, thus producing a new ranking that resolves the main problems in the official version. Among the more significant deficiencies corrected are the lack of due consideration for the home-away status of matches, the fact that a team is better off not playing friendlies than playing them and winning, the fact that deciding a friendly by a penalty shootout is more advantageous because neither team has anything to lose, and the reality that a team has more to gain by defeating San Marino (the weakest team in the ranking) at home in a World Cup or UEFA European Championship qualification match than tying with Spain (the strongest team in the ranking) in a friendly away game. To develop a formula more in keeping with what football experts expect from a team ranking, a number of numerical simulations are presented that correct key parameters accordingly.

The second goal of this article is to address the problem of generating more equitable team groups. To this end we first calculate the "strength" of each national team by adjusting our proposed new FIFA ranking to take into account its historical performance in every World Cup and continental cup tournament. Based on this adjusted ranking we then assign the 8 seeded teams (i.e., the 8 strongest) to pot 1 and then define the other 3 pots as follows: pot 2 contains the countries ranked 9th to 16th, pot 3 contains the countries ranked 17th to 24th and pot 4 contains the countries ranked 25th to 32th. Finally, we design an integer linear programming model that allocates one team from each pot to the four groups. FIFA's geographical conditions limiting the number of European teams to no more than 2 per group and the number from any other continent to no more than 1 per group are included in the model as constraints. The objective function minimizes the difference between the final strength of the strongest and the weakest groups, the strength of a group being defined as the sum of the individual strengths of the group's teams. The idea is to achieve a set of groups that are as balanced as possible. To incorporate FIFA's wish that the final result contain an element of randomness, that is, that it not be derived deterministically, the N best solutions are generated (where N is between 5 and 10) rather than just the optimal solution, and the definitive one is then decided by a weighted draw.