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ACADEMICS FIND FORMULA FOR THE BEST INTERNATIONAL FOOTBALL TEAM

$$\text{PERFORMANCE} = ((111 \times P) + (1.2 \times N) + (5.8 \times E) + (188 \times W) - (1.2 \times W \times E) - 68) - 881$$

Academics from the Cass Business School have devised a formula to determine which international football team should be the best, based on the country's socioeconomic resources, footballing tradition and climate. Using the number of men who play football regularly (P), the number of years the country has been a member of FIFA (N), wealth (W), number of internationals who play abroad (E) and climate, the formula produces a ranking system that can be compared to the actual FIFA performance table, which is based on a team's match results.

Produced by Dr. Gelade at Cass Business School, the formula is the result of statistical research which identified critical factors related to national football team performance. A large range of factors were initially isolated based on the hypothesis that they would affect team performance and each was tested statistically to determine if there was a direct relationship with their FIFA ratings. Some factors, such as the amount of military spending by each country thought to be linked to levels of aggression, were tested but found to have no effect on national team performance. Analysis proved six factors had direct impact and these were combined to produce the Cass formula.

According to the Cass formula, Italy who are on course for their eleventh World Cup final, are ranked 3rd in the world, above their FIFA ranking of 7th. This is because Italy is relatively wealthy, has been a member of FIFA for 99 years and has a regular playing population of 4 million. The other World Cup finalist, France, according to Cass ranking is 5th in the World. Highlighting their underperformance in this World Cup, England are ranked 4th. Both countries are ranked so high because of their wealth, the large number of regular football players (in England 3.3 million) and because they have been long standing members of FIFA.

In addition to highlighting those countries that under-perform, the Cass formula identifies those who do far better than would be expected. Brazil are top of the FIFA rankings, but reflecting the country's low GDP and a tropical climate, which typically means weaker footballing performance, are only 18th in the Cass rankings. The difference demonstrates the impact of cultural factors such as the Brazilians' passion for football, which improves performance but cannot be quantified. In contrast, the US, because it has one of the wealthiest populations in the world, and highest number of regular football players (10.7 million), has the highest Cass ranking. That the US does not take advantage of these benefits (its FIFA rank is 12th) could be explained by Americans generally placing greater importance on being good at other sports rather than football.

Dr. Gelade, author of *Determinants of Success in International Football* said: "These findings show that the performance of a national team is to a large extent determined by the country's climate, wealth and history, and the number of players available. But,

they also make the recent poor performance of England at the World Cup, and of the other home nations in not even reaching the competition, far more disappointing because these teams receive every advantage.”

An additional finding from Dr. Gelade's research is that having expatriate players within a national squad improves the team's performance. Ethiopia and the Democratic Republic of the Congo (DRC) have low GDP, around 200,000 who regularly play football and have been members of FIFA for approximately the same time. However, DRC has a predicted ranking of 72 (FIFA rank 67) while Ethiopia is 143 (FIFA rank 137). The superior performance of the DRC is explained by the difference between the composition of the two countries national teams – 65 per cent of DRC internationals play abroad while only 5 per cent of Ethiopian internationals play abroad.

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NOTES TO EDITORS:

Formula for calculating the rankings of a national football team:

Number of ranking points =

$(111 \times \text{Popularity Index}) + (1.2 \times \text{Number of years member of FIFA}) + (5.8 \times \text{Percentage of expatriate internationals}) + (188 \times \text{Wealth Index}) - (1.2 \times \text{Wealth Index} \times \text{Percentage of expatriate internationals})$

Then: If a hot humid country, subtract 61 x Wealth Index, and a further 87 points. If a cool temperate country, subtract 68 points. Finally subtract 881 points.

Final figure = Number of ranking points which will match the FIFA rating of the national team which is based on match results alone.

The Popularity Index is the logarithm of the number of men who regularly play football. The Wealth Index is the logarithm of the per capita GDP is measured in US\$. Expatriate internationals are international players who play club football abroad. Climate is defined according to the following:

Hot Humid: Avg annual precipitation = 2,139 mm, Avg annual temp = 25.1 deg C, avg vapour pressure = 25.2 hPa

Cool temperate: Avg annual precipitation = 837 mm, Avg annual temp = 7.8 deg C, avg vapour pressure = 8.5 hPa

Countries of the third type have: Avg annual precipitation = 643 mm, Avg annual temp = 22.7 deg C, avg vapour pressure = 16.5 hPa

In the "Hot humid" countries, most of the population live in a tropical or sub-tropical climate zone. In the "cool-temperate" countries, most of the population live in a temperate climate zone. In the third type, which is more mixed, the most common climates are desert or steppe.

- FIFA rankings referred to are an average of rankings achieved 2000-2005.

CASE STUDIES:

- **England:** In the period 2000-2005, England had an average FIFA rating of 726 points, and an average rank of 9. The formula predicts 730 points and an average rank of 4. England's high predicted rank is due to the great popularity of football in the country – some 3.3 million men play football regularly - its high per capita GDP (\$27,700) and its long-standing membership of FIFA (100 years).
- **Germany:** Germany has an average of 723 points in FIFA ratings in the study period, just 3 less than England, and was ranked 11th. The formula predicts 757 points and 2nd place. This is due to Germany's high GDP (\$27,600), its 99 year membership of FIFA, and especially its large pool of regular players (5.4 million).
- **France:** France had an average of 802 points in FIFA ratings between 2000-2005, putting it in 2nd place in the rankings. The formula predicted a ranking of 724 points and 5th place. Compared to England, France has slightly fewer regular players (2.9 million), but this is offset by having more expatriate players than England (58per cent) in the national team. These factors offset each other to produce a similar predicted rank for both countries.

- **Brazil:** Brazil, with 805 points was the highest ranked team by FIFA in the study period. The formula predicted a ranking of 18 (646 points). Although almost 7 million men regularly play football in Brazil, and it has a large number of expatriate players, its predicted performance is lower than England and France because of its low per capita GDP, about 1/4 that of England or France, and lower than Argentina; Brazil also loses predicted points for being a tropical country.
- **Italy:** Italy is ranked 7th by FIFA in the world, with 734 points; the Cass formula predicts 737 points and a rank of 3rd. Italy has 4 million regular players, a high per capita income (\$26,800), and had been a FIFA member for 98 years. Only 3% of its players play abroad.
- **Portugal:** Portugal has only 284,000 regular players, a lower GDP than many European countries (\$18,000) and has been a FIFA member for 80 years. On the other hand, 43% of its players play abroad, and it gains points for being neither a tropical nor a temperate country. The Cass ranking is 19th with FIFA rank 10th. The appointment of a brilliant coach (Scolari was appointed in January 2003) may have contributed to Portugal exceeding their expectations.
- **US:** The formula predicts that the United States would be the strongest team in the world, with 805 predicted points. This is because the US has the largest number of regular players (10.7 million) and one of the highest GDPs (\$37,800) of the countries in our database as well as a long FIFA tradition (89 years) and having 34 per cent of its internationals playing abroad.
- **Ethiopia vs. the Democratic Republic of the Congo:** Ethiopia and the DRC are two similar African countries. The per capita GDP of Ethiopia is \$700, and the per capita GDP of the DRC is \$600. Slightly more people (209,000) play football in Ethiopia than in the DRC (195,000). Ethiopia has been a FIFA member for slightly longer (9 more years) than the DRC. The DRC is a tropical country. These factors would suggest both countries would have similar ranks, although if anything Ethiopia would rank somewhat higher. The DRC strongly outranks Ethiopia. Ethiopia is ranked by FIFA at 137 (predicted rank 143), and the DRC is ranked 67 (predicted rank 72). The main difference between the two countries is that 65per cent of DRC internationals play abroad and only 5per cent of Ethiopian internationals play abroad.
- **The Cass ranking tables and full research paper are available on request.**

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