STATISTICAL ANALYSIS OF REGIONAL DISTRIBUTION OF FOOTBALL CLUBS IN ENGLISH TOP FLIGHT LEAGUE

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Abstract

English football leagues and local competitions are highly followed worldwide. Clubs compete for titles and honors on a yearly basis. English clubs are located in 10 regions of England and Wales. The detailed representation of the clubs according to the regions is rarely

discussed. Analysis is often restricted to club by club performances. This article presents the data analysis of regional distribution of football clubs in the English top flight or top division or top level from inception to the premier league era. Generally, there is a significant uneven distribution of club across the regions. The North West and West Midlands regions have been represented by clubs since the inception to date. Data analysis revealed that the early days of the English top level league were dominated by clubs from North West and London, whereas the regions of the East of England, South West and Wales are least represented in the top league. Also, there seems to be a 'Southern shift' in recent years with increased representation of clubs from Southern England. However, some balance is now maintained given that all the ten regions have been represented by at least one club over the last three seasons; 2016/17 to 2018/19.

1. Introduction

English football is officially divided into 10 regions. Scotland and Northern Ireland, while part of the United Kingdom, have their own football leagues. Individual clubs are grouped according to the 10 regions. This research can provide insights on the following: football performance by region in the UK, assessment of competitive balance of clubs in terms of promotion and relegation and investigation of the shifts in economic power and how they impact upon football. Others are; changing attitudes and the demographic change of club performance over time and exploring issues of proximity and how this affects performance [1]. The analysis can be extended to similar leagues such as the La Liga, Ligue 1, Eredivisie, Serie A, Bundesliga and lower leagues.

The name of the English top flight division has changed since inception, namely; Football League (1888-1892), Football League First Division (1892-1992) and English Premier League (EPL) (1992-present). Regional club representation is rarely discussed but the regional rivalries exist in English football since inception of the top flight division. These are called *Derby matches*. The rivalries may be within regions, for example, North London Derby, Merseyside Derby, Manchester Derby and so on or between regions,

for example London-Northwest rivalry. Sometimes, dominant clubs in top flight division are often viewed the representation of the region. Examples are as follows; Arsenal FC and Chelsea FC are seemed to be representatives of London while Manchester United and Liverpool are viewed as representatives of the Northwest of England. In addition, any club in the top flight division is viewed as a representative of the region. Furthermore, any of the clubs competing in continental competitions like UEFA champions league and Europa League are representation of the region, especially in terms of fan base or club loyalty. However, regional alliances are collapsed during national football competitions [2-4].

Data emanating from football are mostly sought for, because the analysis can provide insight into prediction of match attendances [5-8], prediction of match outcomes and activities [9, 10], betting [11-13] and cost benefit analysis [14]. English leagues in general are very popular and the EPL in particular is the most popular league in the world, and enormous fan base around the world [15] helps the English clubs to increase revenue from television or broadcast rights [16-18].

Some unique features of the English top division, now known as English Premier League (EPL), is that it is not dominated by a few clubs [19], it comprises of highly skilled immigrant players [20-23], and is lowly affected by home advantage [24-27]. These features make the EPL very competitive which translates to increased excitement, which differs from other top European leagues that tend to be constantly dominated by a very small number of elite clubs. The success of the EPL also came at a cost of the perceived reduction of competitive balance and revenue divergence [28-30]. Despite the aforementioned challenges and others, such as discrimination [31], biased officiating [32-34], undue effects of foreign ownership of English clubs [35], increased cost of tickets and burden of injuries [36-37], the EPL continues to record high matchday attendances [38-42].

This article presents the regional distribution of football clubs that have participated in the English top division from inception (1888/1889 season) to

(2018/2019 season). This will help to assess the impact of regions on the performance of the clubs.

2. Research Method

2.1. Data sources

The data were obtained from the English FA website [43], EPL website [44] and Wikipedia [45].

2.2. Data organization

To simplify the interpretation of the data analysis, we organize it into four periods:

• Period I, which is from inception to the start of World War I (1888/89 to 1914/15 season).

• Period II, which is from post-World War I to the start of World War II (1919/20 to 1938/39).

• Period III, which is the post-World War II to the breakaway of the clubs from the Football League First Division to form the Premier League (1946/47 to 1991/92).

• Period IV, which is the English Premier League Era (1992/93 to present).

2.3. Data analysis

The organized data is coded in Minitab 18.0. Descriptive statistics and frequency analysis have been applied to the organized data. Analysis of variance was performed to show that the mean effects of the 10 regions are the same for the four periods. p-value equal to 0.05 is considered significant. The results are presented in tables to facilitate easy comparison.

3. Results and Discussion

The number of clubs (NOC) per region that competed in the English top division is presented in Table 1.

It can be seen from Table 1, 37 out of the 65 clubs that have participated in the top division come from the regions of North West, London, and Yorkshire and the Hunter.

Note: Wales is considered as a region in terms of football competition, even though, it is a country. All the years from inception divided into 4 distinct non-overlapping periods were used. Middlesbrough FC was considered as being in the ceremonial Yorkshire and the Hunter, even though, the city belongs to the North East of England.

The descriptive statistics consider the sum, mean, median, mode, standard deviation (SD) and range. The frequency tables capture the number of the clubs per region for a given period. These are presented distinctly based on the four non-overlapping periods.

3.1. Period I

The results of this period are presented in Table 2 and 3.

From Tables 2 and 3, It can be seen that:

• The first two years of the period I featured only clubs from regions NW, WM and EM.

• Throughout the period, the league was dominated by teams from regions NW, WM and EM and they featured in all of the 27 seasons during this period.

• Regions SE, EE and WA did not feature at all during this period.

• The representations of region WM reduced towards the end of the period.

• Regions NE, YH, LN and SW were represented for the first time in 1890/91, 1892/93, 1904/05 and 1906/07, respectively.

• The highest number of regional representations occurred from 1906/07 to 1910/11 seasons where 7 regions were represented by at least one club. On the other hand, the lowest representation occurred from 1888/89 to

1889/90 seasons where only three regions were represented and generally, the number of teams grew from 12 to 20.

- Region YH rose steadily from one to five club representations.

Table 1. Clubs that have competed in the English top division and their associated regions

Acronym	Region	Clubs	NOT
NW	North West	Preston North End, Blackburn Rovers, Bolton Wanderers, Accrington Stanley, Everton, Burnley, Darwen, Manchester United, Liverpool, Bury, Manchester City, Oldham Athletic, Blackpool, Carlisle United. Wigan Athletics.	15
LN	London	Arsenal, Chelsea, Tottenham Hotspur, Westham United, Brentford, Charlton Athletics, Fulham, Leyton Orient, Queens Park Rangers, Crystal Palace, Millwall, Wimbledon	12
YH	Yorkshire and the Hunter	Sheffield Wednesday, Sheffield United, Grimsby Town, Middlesbrough, Bradford City, Bradford Park Avenue, Huddersfield Town, Leeds United, Hull City, Barnsley	10
WM	West Midlands	Aston Villa, Wolverhampton Wanderers, West Bromwich Albions, Stoke City, Birmingham City, Coventry City	6
NE	North East	Sunderland, Newcastle United	2
EM	East Midlands	Derby County, Notts County, Nottingham Forest, Glossop North End, Leicester City, Northampton Town	6
SE	South East	Portsmouth, Southampton, Brighton & Hove, Oxford United, Reading	5
EE	East of England	Luton Town, Ipswich Town, Norwich City, Watford	4
SW	South West	Bristol City, Swindon Town, Bournemouth	3
WA	Wales	Cardiff City, Swansea City	2

Table 2. Descriptive statistics for period I (1888/89 to 1914/15)

Statistic	NW	LN	YH	WM	NE	EM	SE	EE	SW	WA
Sum	184	21	67	75	40	55	0	0	5	0
Mean	6.81	0.78	2.48	2.78	1.48	2.04	0	0	0.19	0
Median	7	0	3	4	2	2	0	0	0	0
Mode	7	0	2	4	2	3	0	0	0	0
SD	1.08	1.05	1.45	1.69	0.75	1.13	0	0	0.40	0
Range	4	3	5	5	2	4	0	0	1	0

Table 3. Frequency of club composition per region for period I

Frequency	NW	LN	YH	WM	NE	EM	SE	EE	SW	WA	Total
0		16	4	4	4	4	27	27	22	27	135
1		3	2	3	6	3			5		22
2		6	7	5	17	9					44
3		2	6	1		10					19
4			7	11		1					19
5	3		1	3							7
6	7										7
7	11										11
8	4										4
9	2										2
Total	27	27	27	27	27	27	27	27	27	27	270

Table 4. Descriptive statistics for period II (1919/20 to 1938/39)

Statistic	NW	LN	YH	WM	NE	EM	SE	EE	SW	WA
Sum	138	60	88	65	35	34	12	0	0	8
Mean	6.90	3.00	4.40	3.25	1.75	1.70	0.60	0	0	0.40
Median	7	3	4.5	3	2	2	1	0	0	0
Mode	6	3	5	2	2	2	1	0	0	0
SD	1.37	0.65	0.94	1.07	0.44	0.57	0.50	0	0	0.50
Range	5	2	3	3	1	2	1	0	0	1

Table 5. Frequency of club composition per region for period II

Frequency	NW	LN	YH	WM	NE	EM	SE	EE	SW	WA	Total
0						1	8	20	20	12	61
1					5	4	12			8	29
2		4		6	15	15					40
3		12	4	6							22
4	1	4	6	5							16
5	1		8	3							12
6	7		2								9
7	4										4
8	4										4
9	3										3
Total	20	20	20	20	20	20	20	20	20	20	200

3.2. Period II

The results of this period are presented in Tables 4 and 5.

From Tables 4 and 5, it can be seen that;

• The number of teams per season, participating in the top league, was 22 throughout the period.

• Regions NW, LN, YH, WM and NE featured in all of the 20 seasons during this period, but the league was dominated by teams from regions NW, LN, YH and WM.

• Region EM featured in all but one season that is, 1921/22.

• Regions EE and SW did not feature at all during this period.

• Region NW has 9 football club representations from 1919/20 to 1921/22 seasons.

• Region WA featured for the first time in 1921/22 and ended in 1928/29.

• Region SE featured for the first time ever in 1927/28 season.

• Regions YH and WM had, for the first time, more representations than region NW in 1933/34 season.

• The highest number of regional representations occurred from 1927/28 to 1928/29 seasons where 8 out of the 10 regions were represented by at least one club. On the other hand, the lowest representation occurred in 1921/22 season where only 6 regions were represented.

Table 6. Descriptive statistics for period III (1946/47 to 1991/92)

Statistic	NW	LN	YH	WM	NE	EM	SE	EE	SW	WA
Sum	257	215	100	180	55	46	43	60	4	9
Mean	5.59	4.67	2.17	3.91	1.20	1.76	0.93	1.30	0.09	0.20
Median	5	5	2	4	1	2	1	1	0	0
Mode	7	5	2	4	1	2	1	0	0	0
SD	1.64	1.17	1.00	1.17	0.69	0.71	0.68	1.17	0.28	0.40
Range	6	5	5	5	2	3	3	4	1	1

Table 7. Frequency of club composition per region for period III

Frequency	NW	LN	YH	WM	NE	EM	SE	EE	SW	WA	Total
0			2		7	3	11	14	42	37	116
1			7	1	23	9	28	13	4	9	94
2			23	5	16	30	6	13			93
3	4	7	10	8		4	1	3			37
4	11	13	3	19				3			49
5	9	20	1	9							39
6	5	1		4							10
7	11	4									15
8	5	1									6
9	1										1
Total	46	46	46	46	46	46	46	46	46	46	460

Table 8. Descriptive statistics for period IV (1992/93 to present)

Statistic	NW	LN	YH	WM	NE	EM	SE	EE	SW	WA
Sum	150	151	48	67	40	25	32	19	5	9
Mean	5.56	5.60	1.78	2.48	1.48	0.93	1.19	0.70	0.19	0.33
Median	5	6	2	2	2	1	1	1	0	0
Mode	5	6	1	2	2	0	1	0	0	0
SD	1.31	0.57	1.19	0.94	0.58	0.96	0.56	0.72	0.40	0.55
Range	5	2	4	4	2	3	2	2	1	2

3.3. Period III

The results of this period are presented in Tables 6 and 7.

From Tables 6 and 7, It can be seen that;

• The number of teams per season, participating in the top league, was 22 throughout the period.

• Regions NW, LN, YH, WM and NE featured in all of the 20 seasons during this period, but the league was once again dominated by teams from regions NW, LN, YH and WM.

• Region EM featured in all but one season; that is, 1921/22.

• Regions EE and SW did not feature at all during this period.

• Region NW had 9 football club representations from 1919/20 to 1921/22 seasons and its dominance diminished towards the early 90s.

• Region EE had strong representations from 1982/83 to 1984/85.

• Regions SW and WA were not represented by a club for 3 out of the 46 seasons in this period.

• Region WA featured in 1952/53 for the first time since 1928/29.

• The highest number of regional representations occurred in 1981/82 season where 9 out of the 10 regions were represented by at least one club. On the other hand, the lowest representation occurred from 1964/65 to 1964/65 season, where only 6 regions were represented.

3.4. Period IV

The results of this period are presented in Tables 8 and 9.

From Tables 8 and 9, it can be seen that;

• The number of teams per season participating in the top league was 22 at the start of the period, and was reduced to 20 in 1994/95, with no further changes since then.

- Regions NW, LN, YH and WM have featured in all of the 27 seasons during this period, but the league was once again dominated by teams from regions NW, LN, YH and WM.

- Region NE featured in all but one season; that is, 1921/22. Similarly, region SE featured in all but two seasons.

- Region WA was represented, for the first time in this period, in 2011/12 season and is still represented to date.

- Region WA was represented by 2 teams for the first time in the history of the English top division in 2011/2012 season.

- It took 21 years for the region SW to be represented since 1993/94 season.

- Regions SW and WA had not been represented for 18 out of the 27 seasons.

- Regions EE, SW and WA had concurrently not been represented in 11 out of 27 seasons.

- Region SE only featured one team from 1992/93 to 2002/03.

- Region NE has been represented by only two clubs from inception till now. (Note that Middlesbrough FC is in the ceremonial Yorkshire and the Hunter region.)

- For the first time in the history of the English top flight league, all the regions were represented in 2015/16 season and all are still represented to date.

- Regions NW and LN have been the most dominant in terms of club representation throughout this period.

- Region YH has not featured for only 10 seasons since the inception of top flight football in English.

- From 1904/05 till now, region LN have had at least one representative.

● The least regional representation of teams occurred in 2010/11 season with only 4 out of the 10 regions being represented. The last time such a low number of regional representatives were observed was in 1891/92 season.

Table 9. Frequency of club composition per region for period IV

Frequency	NW	LN	YH	WM	NE	EM	SE	EE	SW	WA	Total
0			4		1	11	2	12	22	19	71
1			8	3	12	9	18	11	5	7	73
2			7	12	14	5	7	4		1	50
3	1		6	9		2					18
4	5		2	2							9
5	8	12		1							21
6	6	14									20
7	5	1									6
8	2										2
Total	27	27	27	27	27	27	27	27	27	27	270

3.5. Analysis of variance

Analysis of variance (ANOVA) computed for each period showed that the mean effect for the distribution of the football clubs across the regions is significant at p-value of 0.05. The summary of the ANOVA is presented in Table 10.

Table 10. ANOVA summary for all the periods

Period	F	p-value	F criteria
I	178.2985	< 0.0005	1.915995
II	184.8206	< 0.0005	1.929425
III	175.8343	< 0.0005	1.900688
IV	155.4356	< 0.0005	1.915995

Table 11. The overall regional representation of clubs in the English top flight football league from inception to present and their ranks

Region	Period I	Period II	Period III	Period IV	Total	Rank
North West	27	20	46	27	120	1st
London	11	20	46	27	104	6th
Yorkshire and the Hunter	24	20	44	23	111	3rd
West Midlands	27	20	46	27	120	1st
North East	25	20	39	26	110	4th
East Midlands	27	19	43	16	105	5th
South East	0	12	35	25	72	7th
East of England	0	0	32	15	47	8th
South West	5	0	4	5	14	10th
Wales	0	8	9	8	25	9th

3.6. Overall regional summary

The overall summary of the regional representations of football clubs in England from inception to now is presented in Table 11.

Table 11 summarizes the data by top performing region, and shows that the North West and West Midlands regions had at least one club featured in 120 seasons of the English top division; more than any other region. In contrast, the East Midland's clubs show a gradual decline in participating in the top league. The South West and Wales have the least representations over the whole period.

Different trends can be seen which may suggest changing social attitude towards the league [46] and diverse economic disequilibrium in the regions [47]. The methodology of analyzing the region instead of the individual clubs is justified by the works of [48] that asserted that there are no football clubs that can be deemed a representation of the regions, although the best clubs, and especially those that have won domestic international titles, may be regarded as ambassadors of the region.

Alternative ways of data analysis can be employed as seen in the analysis of the following data: royal rumble [49], penalty throws in handball

[50], uncertainty analysis [51], kick frequency [52], Olympics [53], and others [54-60].

4. Conclusion

The article showed significant uneven distribution of football clubs across the 10 regions of England. Overall, there has been a 'Southern shift' in recent years with clubs such as Watford, Bournemouth, Brighton, and Fulham winning promotion whilst clubs from the North East and West Midlands have been relegated. Similar leagues can be investigated using the same approach adopted in this work.

Acknowledgement

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