The Efficiency of Premier League Clubs According to the Country of Origin of the Majority Owner

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Abstract: Owning a successful football club is a matter of good management, financial stability but also prestige. Owning a club participating in the English Premier League, the most prestigious and richest football competition in the world, has so far attracted investors from the Middle and Far East, the United States and other parts of the world. The aim of the presented paper was to use data envelopment analysis to calculate efficiency and then evaluate and compare the efficiency of selected clubs of the English Premier League owned by British investors and by foreign ones. The researched period are the seasons 2019/2020 and 2020/2021. The data used were obtained from the official databases of both examined sports competitions and subsequently supplemented with private databases of companies operating in the football environment. In terms of results, some implications for the management of football clubs are discussed and suggestions for increasing efficiency in inefficient clubs are made. Clubs owned by British investors are not generally less efficient than clubs owned by foreign investors and vice versa.

Keywords: sport management; football; data envelopment analysis; efficiency; performance factors

JEL Classification: C10; L83; C67; C44

1. Introduction

Currently, football is one of the most important sports, and at the same time a business of high economic importance. In the last few years, there have been active negotiations concerning the ownership of the clubs of the most prestigious football competition in the world, the English Premier League. Every year, the largest amount of funds flow into the English top football competition compared to other European top football competitions. The prestige and attention of the media and spectators has already attracted investors from the Middle and Far East, the United States and other parts of the world.

Every sport organization strives to evaluate its performance: its weaknesses and strengths. Nowadays, success in the professional football league is related to successful coaching and leading the entire team. But the efficiency goes beyond that kind of perspective onto the company level. There, the board and crucially the owner is willing to see club's increasing performance charts and curves. In the world of business, the comparison with the competition is important to important for objective evaluation of the company's direction. One of the most favored methods for this kind of analysis is the data envelopment analysis (DEA).

The aim of the presented paper is to contribute to previous research and to use data envelopment analysis to calculate efficiency and use it to compare the efficiency of selected clubs of the English Premier League that are owned by British investors and by foreign ones.

The hypothesis is based on an assumption that a foreign investor should have lower emotional ties to the club than the British owner. He should therefore place higher demands on club performance, both on and off the pitch. Because the financial reality of every football club is closely linked to the team's performance on the pitch, sports and economic metrics are used in the work. The presented research evaluates the performance of English professional football clubs that participated in two consecutive seasons (2019/2020 and 2020/2021) in the top-level English football competition.

2. Performance Management of Sports Companies

The English professional football clubs which were playing in the Premier League, the top-tier English football competition, in the seasons 2019/2020 and 2020/2021 were selected to evaluate performance. The specificity of European football competitions is the closedness of individual performance levels (competitions). Sports companies (football clubs) do not have the opportunity to move freely between levels, but, for example, unlike professional sports competitions in the United States, there are clear rules under which they can do so – at the end of the season by relegation or promotion. Newly established companies cannot immediately participate in the highest competitions, they have to go through a long way from the lowest competitions to professional leagues. That is why it is often more advantageous for investors to buy an already "well-established" club with a history, fan base and sports and personnel facilities than to establish a club on a green field. At the same time, one investment entity may not own more than one football club that participates in European Cups. This is a safeguard for the oligopolization of professional European football (UEFA Article 5, 2021).

A wide range of authors deals with the performance of sports companies. The majority of the researchers use only sports statistics in order to evaluate the club's efficiency, the rest combines the sport and economic metrics to achieve more accurate efficiency results.

In their research, Espitia-Escuer and Garcia-Cebrian (2016) apply the DEA method and the Malmquist Indices to the ranking of football teams that have participated in the UEFA Champions League. Barros and Douvis (2009) estimate productivity changes using DEA analysis applied to a representative sample of football clubs operating in two European countries: Portugal and Greece. They rank football clubs according to their productivity changes between the 1999/2000 and 2002/2003 seasons, concluding that some clubs saw productivity growth while others saw productivity decline (Barros & Douvis, 2009).

Halkos and Tzeremes (2013) use the DEA to compare the actual level of market value of football clubs and their performance. The research shows that the level of market value of football clubs has a negative effect on their performance. The high value of football clubs does not guarantee the higher performance.

Petrović Djordjević (2015) used the nonparametric variable output-oriented DEA model and analyses technical efficiency of the national football teams in the qualifications for 2010

FIFA World Cup. DEA model has a two-stage structure, the first stage uses inputs to generate outputs that then became the inputs to the second stage.

Arabzad et al. (2013) utilized a DEA model to identify the best English Premier League football players. Another type of DEA model has been used to rank the selected players. The proposed approach has been examined in the English Premier League 2010/2011. Findings imply that Rooney, Drogba and Tevez are ranked as first, second and third players.

3. Statistical and Quantitative Methods Used

The methods in the work can be divided into statistical and exact. In addition to descriptive statistics, the statistical methods used include, in particular, dependency analysis especially, correlation analysis. Correlation analysis examines the relationships of variables using dependency measures (correlation coefficients). Correlation indicates the degree of association of two variables. It is important to distinguish between correlation and causality, i.e. the direct relationship between cause and effect. Hendl (2012) explains that correlation, however strong, does not by itself mean evidence of a causal relationship, i.e. that changes in the variable X actually affect the changes in the variable Y.

In the main part of the paper the method of data envelopment analysis (DEA) is used, a quantitative method based on the theory of business economics. DEA models are divided into input-oriented and output-oriented models. Using input-oriented models, it is possible to estimate the degree of technical efficiency, which determines the reduction of input indicators, so that the unit becomes technically efficient with unchanged output. Effective units get a score of 1, inefficient ones get a lower score in the interval between 0 and 1 (Cooper, 2011).

The research of sports performance of companies is also connected with their economic performance, when the club receives a financial reward from the league competition authority for placing in the table according to the points obtained at the end of the season. The better the position the club achieves, the higher the financial reward. In addition, clubs compete with each other for funding for television rights. It is true that the more often the league matches of a given club are broadcast on television screens, the greater the reward the club will receive when redistributing these funds. The financial reward for placing in the table does not cover all the costs of the clubs, so sponsorship and partnership agreements come into play and, of course, the involvement of the owners and their financial help is also taken into account.

The BCC model (Banker, Charnes and Cooper) is an input-oriented model, considering variable economies of scale and estimating Pure Technical Efficiency (PTE) (Sengupta, 1995). The CCR model (Charnes, Cooper and Rhodes) considers constant economies of scale and estimates Overall Technical Efficiency (OTE), which consists of two parts, Pure Technical Efficiency (PTE) and Scale Efficiency (SE). Scope efficiency is then determined by the relationship between OTE and PTE and indicates the extent to which the unit can improve its efficiency by changing its size (Cooper, 2011). The BCC and CCR models form two basic (mathematically simplest) DEA models.

4. Methodology and Data

Creating a database is preceded by data collection from several sources. In addition to publicly available information published by the football competitions themselves, the data sources used in the paper also include private databases of a company dealing with sports data analysis, the InStat. The economic data were obtained from the specialized server Transfermarkt. The complexity of the database used in the work lies in the combination of the mentioned sources and their supplementation with data from the register of companies doing business in the United Kingdom of Great Britain and Northern Ireland (UK Business Register, 2021). The research process can be divided into the following phases:

1. **Creating a list of evaluated companies** – in the first step, a database of surveyed clubs that participated in the period under review, i.e. the 2019/2020 and 2020/2021 seasons, was created. To better work with the data, the names of the surveyed clubs were shortened to three-letter abbreviations. The majority owner and his country of origin were traced to these clubs. The majority owners and their country of origin is listed in Table 1.

Table 1. Majority owners of selected sports companies

Club	Parent company or fund	Majority owner name	Country
BOU	Opalus Trust	Maxim Demin	RUS
ARS	Kroenke Sports & Entertainment	Stan Kroenke	USA
AVL	NSWE Group	Nassef Sawiris	EGY
BRI	B&H Albion Holdings Ltd	Anthony Grant Bloom	GBR
BUR	ALK Capital	Alan Pace	USA
CHE	Fordstam Ltd	Roman Abramovich	RUS
CRY	Palace Holdco LP	Steve Parish (Harris, Blitzer)	GBR
EVE	OOO USM Holding Co	Ferhad Moshiri	GBR
FUL	Shahid Rafiq Khan Family Trust A	Shahid Khan	PAK
LEE	Aser Group Holding	Andrea Radrizzani	ITA
LEI	King Power	Aiyawatt Srivaddhanaprabha	THA
LIV	Fenway Sports Group	John Henry	USA
MCI	City Football Group	Sheikh Mansour	SAE
MUN	Red Football Ltd	Glazer (rodina)	USA
NEW	St James Holdings	Michael Ashley	GBR
NOR	Norwich City Plc	M. Wynn-Jones, D. Smith	GBR
SHU	Blades Leisure Ltd	Abdullah bin Mosa'ad	SAU
SOU	Lander Sports Development Co Ltd	Gao Jisheng	CHN
TOT	ENIC Group	Joe Lewis	GBR
WAT	Hornets Investment Ltd	Gino Pozzo	ITA
WBA	Yunyi Guokai Sports Development	Lai Guochuan	CHN
WHU	WH Holding Ltd	David Sullivan	GBR
WOL	Fosun International	Guo Guangchang	CHN

In the second column of the Table 1 are listed parent companies for the clubs playing the English Premier League in the observed period. For the Norwich City FC (NOR) there is no evidence of parent company, instead the major owners – Mr. Michael Wynn-Jones Mrs. Delia Smith – are the major owners of Norwich City FC Plc. The rest of the clubs has a major owner either in the form of a parent company or an investment fund.

2. **Collecting of sport and economic metrics** – data concerning the sports performance of clubs in the mentioned seasons was added to the list.
   a) The sport data can be divided by several perspectives. First, we can determine whether the statistics are offensive or defensive. Or you can determine whether the statistic is positive or negative (a typical negative statistic can be the number of fouls in the season). And last but not least it is possible to determine whether the statistic is in absolute or relative units. All the sport data with no exceptions were provided by statistical company InStat and its server instatscout.com (InStat Football Data, 2021).
   b) Then, the information about the average attendance and a maximum stadium capacity from the official English Premier League database was added (Premier League, 2021).
   c) The economic data consisted of a sum of market values of players who have played at least one match of the season, obtained from the open Transfermarkt database. These data do not include actual transfer amounts but estimated current market values of the players (Transfermarkt, 2021).
3. **Determination of inputs and outputs of DEA model** – one of the most important steps of creating and calculating the DEA model is determination of relevant inputs and outputs. In the paper research, three inputs and one output have been chosen. All factors are chosen so that the inputs correlate between themselves weakly or not at all, in relation to the output is required the highest possible degree of correlation. Bowlin (1998) established the rule that the number of DMUs should be at least three times the number of inputs and outputs. The chosen inputs and outputs are listed in the Table 2.

Table 2. Inputs and outputs of the DEA model

Factor	Resource	Input/Output
Squad size	InStatScout DB	Input
Total Market Value	Transfermarkt DB	Input
Average Stadium Occupancy	EPL DB	Input
Total points	EPL DB	Output

   a) The inputs include the squad size of the club in the season. The squad is defined as the number of players who have started at least in one match of the season. The second input is the total market value of the squad in the season. Average stadium occupancy was calculated as the share of the average stadium attendance in the season and the maximum possible capacity of the stadium.
   b) The only output of the model is the total points achieved by club in the end of the season.
4. **Determination of technical efficiency values** – to measure the performance of football clubs, an input-oriented CCR model was used. The CCR model measures overall technical efficiency (OTE$_{CCR}$). The model aggregates pure technical efficiency (PTE) and scale efficiency (SE) into a single value. The OSDEA-GUI (Open-source DEA) software was used for all the calculations related to DEA. The data were entered into the software separately after each season in the form of csv files with inputs and outputs in separate

columns. The efficiency limit defines the maximum output combinations that can be selected for a given set of inputs. Assuming a set of n DMUs, each DMU_j ($j = 1,\dots, n$) uses m inputs x_{ij} ($i = 1, 2,\dots, m$) to create with outputs y_{rj} ($r = 1, 2,\dots, s$). Input-oriented models with constant returns to scale can be formulated according to equation (1) to minimize inputs while keeping outputs at their current level.

$$min\ \theta - \varepsilon\left(\sum_{i=1}^{m} s_i^- + \sum_{r=1}^{s} s_r^+\right)$$

$$s.t. \sum_{j=1}^{in} \lambda_j x_{ij} + s_i^- = \theta x_{ip} \qquad i = 1, 2, \dots, m \tag{1}$$

$$\sum_{j=1}^{n} \lambda_j y_{rj} + s_r^+ = y_{rp} \qquad r = 1, 2, \dots, s$$

$$\lambda_j, s_i^-, s_r^+ \geq 0, j = 1, 2, \dots, n.$$

The overall technical efficiency of the DMU is measured in relation to the other units analyzed using the efficiency score. The overall level of technical efficiency (CCR-I OTE) is taking on values in the range $\langle 0, 1 \rangle$. Technically efficient DMUs achieve efficiency rates of 1, inefficient units the efficiency rates are less than 1 (Cooper, 2011).

5. **Comparison of the performance of football clubs owned by the British owners and the foreign ones** – a non-parametric test was chosen because using the Shapiro-Wilk test, it was proved that the values of the individual variables do not have a normal distribution. A Kolmogorov-Smirnov test was used to compare the performance of selected club groups divided according to the origin of the majority owner. The Statgraphics Centurion XVIII software was used for statistical testing at a significance level of 5%.

5. Research Results

Applying an input-oriented CCR efficiency model, the performance levels achieved by English football teams for seasons 2019/2020 and 2020/21 are reported in Table 3. The analysis shows how clubs are able to convert the inputs into points gained within competition tables. The values refer to the current members of the season.

The CCR-I model described 3 clubs as efficient in the first season and 5 clubs in the second season. The efficient clubs have chosen the appropriate sports tactics and at the same time are able to efficiently transform the inputs into outputs and have the optimal size. The most efficient club in the researched period of two seasons in the English highest competition is Burnley FC. As the only one, the club has managed to be efficient in both observed seasons. Liverpool FC and Sheffield United FC achieved an efficient OTE$_{CCR}$ score in the 2019/2020 season. In the second season, beside Burnley FC, were determined as efficient Leeds United FC, Manchester City FC, Manchester United FC and West Ham United FC.

Table 3. OTECCR score of clubs playing English Premier League in seasons 2019/2020 and 2020/2021

DMU			Season					Avg.
			2019/2020		2020/2021		↑↓	
Abbr.	Full name	Owner origin	Pos.	OTE$_{CCR}$	Pos.	OTE$_{CCR}$		
BOU	AFC Bournemouth FC	RUS	18	0.5925	-	-	-	-
ARS	Arsenal FC	USA	8	0.6914	8	0.7815	↑	0.7365
AVL	Aston Villa FC	EGY	17	0.6493	11	0.8148	↑	0.7321
BRI	Brighton & Hove Albion FC	GBR	15	0.7543	16	0.6062	↓	0.6803
BUR	Burnley FC	USA	10	1.0000	17	1.0000	→	1.0000
CHE	Chelsea FC	RUS	4	0.7889	4	0.7637	↓	0.7763
CRY	Crystal Palace FC	GBR	14	0.7383	14	0.8695	↑	0.8039
EVE	Everton FC	GBR	12	0.7275	10	0.8365	↑	0.7820
FUL	Fulham FC	PAK	-	-	18	0.4753	-	-
LEE	Leeds United FC	ITA	-	-	9	1.0000	-	-
LEI	Leicester City FC	THA	5	0.8871	5	0.8540	↓	0.8706
LIV	Liverpool FC	USA	1	1.0000	3	0.7516	↓	0.8758
MCI	Manchester City FC	SAE	2	0.9415	1	1.0000	↑	0.9707
MUN	Manchester United FC	USA	3	0.7931	2	1.0000	↑	0.8966
NEW	Newcastle United FC	GBR	13	0.7894	12	0.7633	↓	0.7764
NOR	Norwich City FC	GBR	20	0.3888	-	-	-	-
SHU	Sheffield United FC	SAU	9	1.0000	20	0.5260	↓	0.7630
SOU	Southampton FC	CHN	11	0.9254	15	0.6553	↓	0.7904
TOT	Tottenham Hotspur FC	GBR	6	0.6846	7	0.8285	↑	0.7565
WAT	Watford FC	ITA	19	0.6164	-	-	-	-
WBA	West Bromwich Albion FC	CHN	-	-	19	0.6026	-	-
WHU	West Ham United FC	GBR	16	0.6292	6	1.0000	↑	0.8146
WOL	Wolverhampton Wanderers FC	CHN	7	0.9846	13	0.8010	↓	0.8928
		Avg.	-	**0.7791**	-	**0.7965**	-	-

On the other side of the efficiency spectrum, Norwich City FC and Fulham FC were the least efficient clubs in the observed seasons. After achieving this unflattering score, both clubs have been relegated. The clubs that have been relegated in the end of the seasons (the last three clubs in the table) have never have OTE$_{CCR}$ score higher than 0.6200.

The average OTE$_{CCR}$ score in the first season was 0.7791, in the following season the score has slightly increased to 0.7965. As was already mentioned, the number of efficient DMUs has raised as well from 3 to 5 between seasons.

Among the clubs that have participate both of the observed seasons, Burnley FC (1.0000), Manchester City FC (0.9707), Manchester United FC (0.8966), Wolverhampton Wanderers FC (0.8928) and Liverpool FC (0.8758) were the top 5 clubs by OTE$_{CCR}$ average score. Above the seasonal average were 10 clubs in the first season and 11 in the second season. The arrows in the last but one column shows trend of the OTE$_{CCR}$ score among seasons. For example, Chelsea FC's down arrow shows that the OTE$_{CCR}$ score dropped from 0.7889 in the first season to 0.7637 in the second season. Beside the OTE$_{CCR}$ scores Table 3 shows the position of the clubs in observed seasons.

The first of the graphs (Figure 1) shows OTE$_{CCR}$ score and the rankings of clubs with the majority owned by British investors. Among these clubs, only Newcastle United FC was above the OTE$_{CCR}$ score average in the first observed season. In the second season, four clubs with a majority of British owners reached OTE$_{CCR}$ above average. The value of OTE is shown on the main vertical axis, and the rankings of the clubs in the table on the secondary vertical

axis. The horizontal axis contains clubs in the English Premier League, where the majority share is controlled by British owners. The first season is shown in blue (horizontal stripes & rhombus), the second one in red (vertical stripes & triangle).
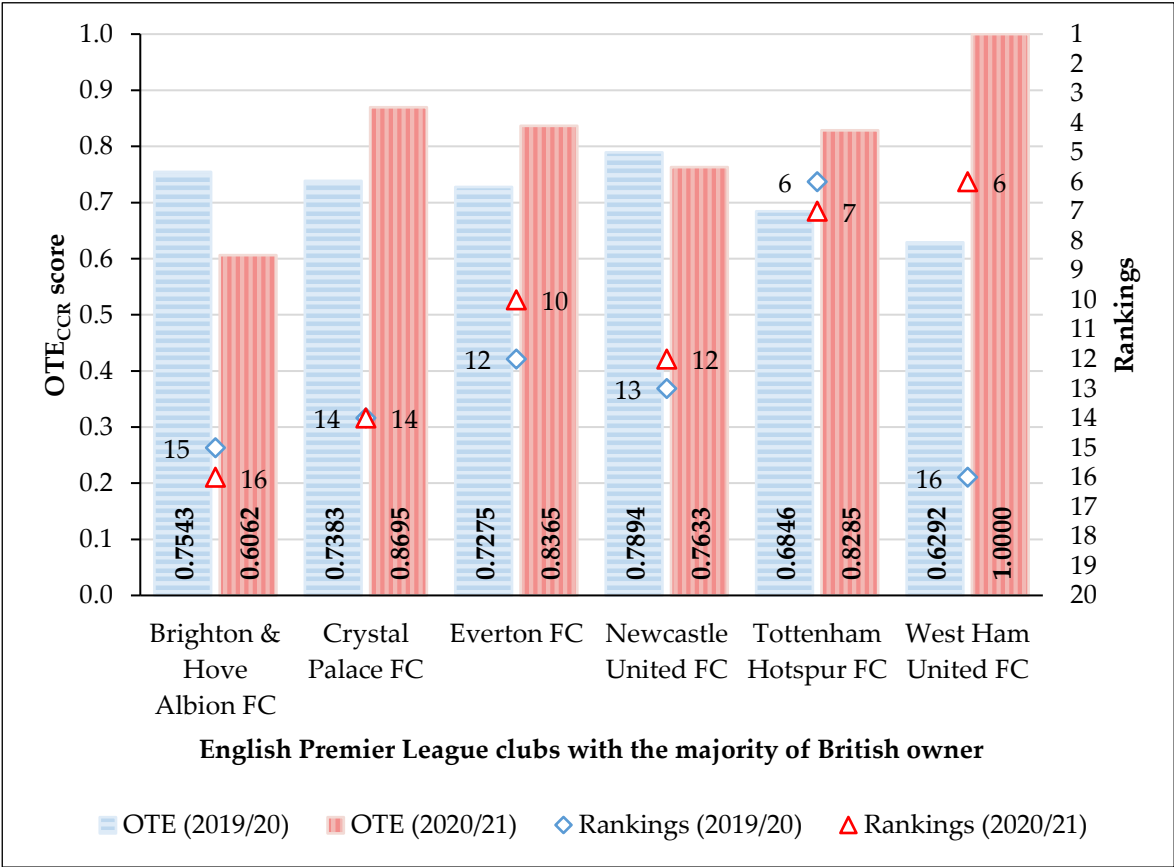

Figure 1. OTE$_{CCR}$ score and rankings of English Premier League clubs with the majority of British owner

The largest cross-season positive difference in both the value of OTE$_{CCR}$ and the ranking in the table was achieved West Ham United FC. In the 2019/2020 season, the club was on the verge of relegation to the second highest English football competition (16th place), in the following season 2020/2021 it placed sixth, thus guaranteeing the company participation in European cups. Interestingly, West Ham United FC achieved an OTE$_{CCR}$ score of 0.6292 in the first observed season – which was the worst score of any Premier League club that season. In the following season, the club reached the effective value of the OTE$_{CCR}$ score. This is the most significant cross-season improvement in the value of OTE among all the clubs surveyed.

The ranking in the table for other British-owned clubs differed by a maximum of two places seasonally, which means a relatively constant sports performance of the clubs. The value of OTE$_{CCR}$ of other clubs in the 2019/2020 season ranged from 0.6846 to 0.7894, in the 2020/2021 season from 0.6062 to 0.8695.

The OTE$_{CCR}$ score of Premier League clubs owned by foreign investors showed a higher range of variation compared to companies owned by British investors. Due to the high number of DMUs, club names are shown as three-letter abbreviations in the following graph (Figure 2).
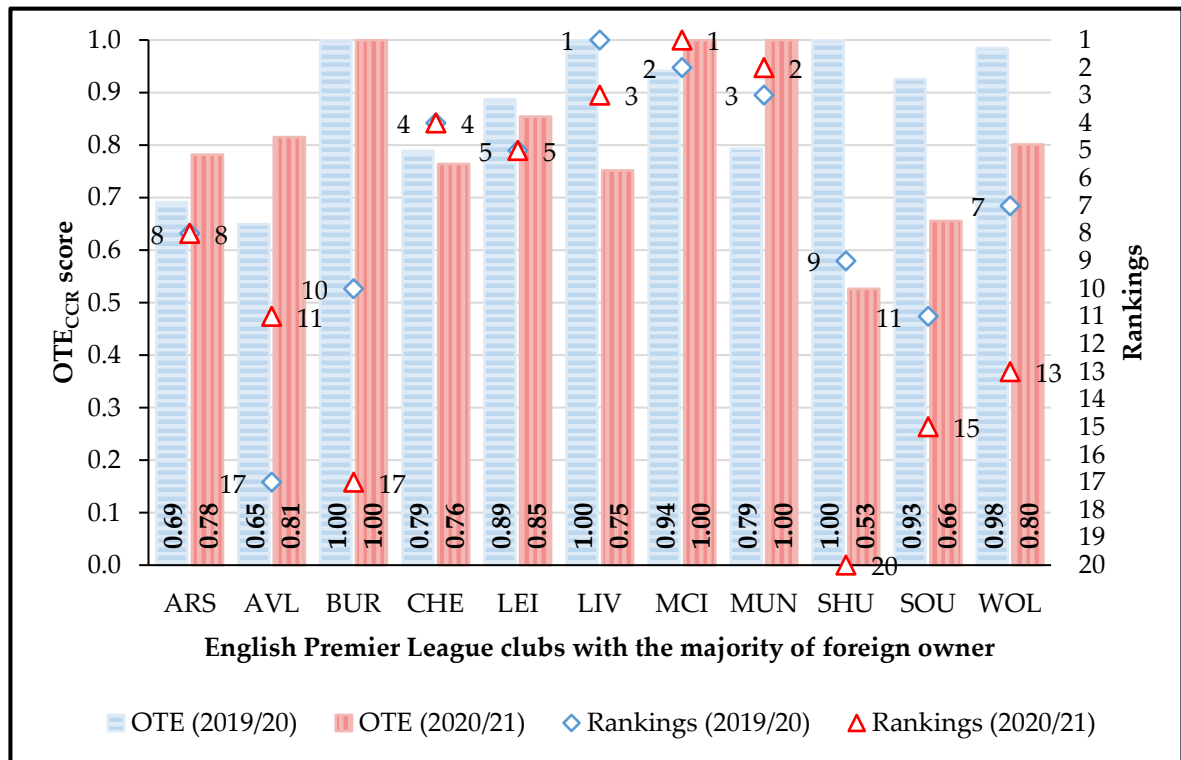
Figure 2. OTE$_{CCR}$ score and rankings of English Premier League clubs with the majority of foreign owner

A phenomenon typical for football clubs, called the second season syndrome has taken place in the case of Sheffield United FC (SHU) in the 2020/2021 season. This phenomenon is connected with the fact that a club that promote to the top-tier football competition in its country can compete with the best clubs in the first season, but in the second season it does not build on successes and relegates from the top-tier competition.

The average OTE$_{CCR}$ score for clubs with domestic owners increased from 0.7206 to 0.8173 seasonally. West Ham United FC had the greatest impact on improving the average. On the other hand, the average seasonal score of OTE$_{CCR}$ fell from 0.8042 to 0.7876 for clubs with a foreign majority. Sheffield United FC had the biggest impact on the deteriorating average.

In the first observed season, clubs owned by foreign investors were in average more efficient than clubs owned by British investors. In the second season, clubs owned by British investors were in average more efficient.

6. Discussion and Conclusion

In this paper, the effectiveness of professional football clubs playing the English Premier League was measured. For this purpose, the time span of two seasons from 2019/20 to 2020/21 was taken. The efficiency of football clubs was measured using the non-parametric DEA method. Number of players, total market value of the team and average stadium occupancy were chosen as club inputs. The average stadium occupancy was added to the standard models used by other several authors. Output was measured by the total number of points in the season. This particular specification proved to be suitable for this application, but can also be used to analyze the effectiveness of other team sports.

Nowadays, there is an increasing need to know how efficiently a club uses its resources due to the current economic and financial situation. Based on the analyzed seasons, there are several conclusions of the research: in both of the observed seasons, the winner of English Premier League was always marked as efficient. The club with the lowest efficiency was relegated in both cases. Also, it can be stated that there are no significant differences between clubs owned by British and foreign investors. It is also possible to discuss the sources of clubs' inefficiency. The first source of clubs' inefficiency is related to the waste of resources. Clubs should only need a lower value of inputs (either a lower number of players, a lower total squad market value or a lower average stadium occupancy) to achieve the same output.

As the hypothesis of the paper was stated, clubs owned by foreign investors should be in average more efficient than clubs owned by British investors. But in the second season, the clubs owned by British investors achieved higher average OTE_{CCR} score. The hypothesis cannot be confirmed nor rejected – the following research could be done on longer time period. Also, the BCC model can be compiled for scale efficiency and pure technical efficiency calculation. By calculating the scale efficiency, the second source of inefficiency could be determined. The BCC model should be applied in further research to assess a detailed view on the sources of inefficiency. The smaller football clubs have always an opportunity to get inspired by the big clubs, e.g. Manchester City FC or Chelsea FC. They should transfer practices that can be useful for them and gradually improve – at the level of sports management, medium and long-term vision or financial management.

Conflict of interest: none

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