Relationship between sport and financial performance in top European football clubs

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Abstract: The Champions League has been the most elite football competition in Europe for several decades. Achieving sports successes makes it much easier for football clubs participating in the Champions League games to have very good financial results, which allow them to spend significant amounts on the purchase of players and their salaries. The total market value of the players in some teams exceeded 1 billion EUR in the 2018/2019 season. In the article the relationship between financial results and sports results in national and international competitions in the seasons 2014/2015–2018/2019 is verified. The efficiency of the football clubs under investigation is verified using a model developed by the author of the article. In addition, dynamics of changes in profits, expenditure on salaries and operating activities as well as the market value of selected European football clubs is presented. The results of the analysis allow to identify football clubs whose activities are characterized by the highest efficiency. Both the market value of the players and the expenses on their salaries have a significant, positive impact on sports performance. However, among the leading European football clubs one can distinguish those that functioned much more effectively than their competitors. Sports successes contribute to increasing the market value of players, but also involve the need to allocate larger amounts to players' wages.

Keywords: financial result, operating costs, market value, wages costs, sport results

1. Introduction

International football competitions have taken place in Europe for several decades. Participants of the competitions have been the best teams representing national football leagues. In the recent years, teams from Spain, the UK, Italy and Germany have had the strongest position on the European market. Representatives of these countries have dominated the games of the Champions League and the European League—two currently played international football competitions in Europe. Along with the growing popularity of the games, many scientific studies have been carried out regarding leading European football clubs.

The article aims to determine the mutual relations between investment expenditure and financial and sports results in football clubs, to prioritize the factors that determine the sports and financial result, and to indicate football clubs with the best relationship between investment outlays and outcomes.

The research has allowed to determine which clubs made the best use of these resources compared to competitors with similar financial possibilities. Based on the analysis of the cited literature on financial and sports performance, the following hypotheses were formulated:

H1: Increase in investment outlays contributes to the improvement of sports results in national and international competitions.

H2: Football clubs that achieve the best sports results are also characterized by the highest effectiveness (the best ability to transform investment outlays into financial and sports results).

H3: Greater financial possibilities of some football clubs may be offset by better use of available resources and application of the appropriate business model by their market competitors.

2. Literature review

The most common method for analyzing data related to the functioning of football clubs is Data Envelopment Analysis (DEA). DEA is a non-parametric method. It enables to test the effectiveness of results depending on incurred inputs. In other words, it measures the effectiveness of converting inputs into results. In DEA, efficiency is defined as the quotient of the sum of weighted effects and the sum of weighted inputs. It is based on linear programming and used to measure the relative effectiveness of the tested objects in a situation where, due to the existence of many inputs and many effects, the measurement of effectiveness is difficult. The comparative measure in this method is the difference in effectiveness, because measuring effectiveness consists in determining the distance between given points and the borderline productivity.

Other methods used in the analysis of this topic include linear regression analysis, factor analysis, logistic regression, and stochastic methods. Most of the analyses cover one of the markets representing the leading European football leagues. Examples of the use of these methods will be presented in more detail in this article. Below there is a review of studies on the relationship between sports and financial results in football and business strategies adopted by football clubs.

Based on DEA, Kulikova and Goshunova (2013) showed that the sports performance of English football clubs mainly depended on the skills of players and coaches and their wages. The efficiency of the French league football clubs, in turn, was verified by Jardin (2009), who, using DEA, examined the dynamics of changes in the effectiveness of clubs playing in Ligue 1. In his analysis, the clubs that had scored the most points in league games or generated the highest income were not recognized as most effective due to overinvestment. The analysis showed that generally, clubs in the French league should be considered effective, but at the same time indicated deterioration in the external conditions in which they had to operate. Halkos and Tzeremes (2013) took into account the number of cups won by clubs to measure their sports efficiency. They used DEA to analyze 25 European 2008–2011 taking revenues, operating costs and the share of loans in the club's total liabilities as input vari-

ables. Their analysis shows that the effectiveness of sports results is not the outcome of high revenues or the value of other financial indicators. García-Sanchez (2007) analyzed clubs from the Spanish league using DEA, thus verifying the effectiveness of the clubs appearing in La Liga in the 2004/2005 season. According to this study, getting a high number of points was largely dependent on the defense and attack performance, which in turn depended on the value of the players and size of the team squad.

A statistically significant relation between sports results, players' salary costs and their value was demonstrated by Carmichael, McHale and Dennis (2011), who created a unique indicator of sports efficiency. The indicator was based on the share of points obtained by the team in league games in the total number of points scored by all teams that participated in the competition. The purpose of their research was to reflect the club's competitive advantage as participation in sporting successes. The DEA method used to analyze the efficiency of English clubs brought two different results in the studies of Guzmon and Morrow (2009) and Haas (2003). Both works used the same variables—the cost of wages for footballers and coaches. In the former study, a 20% reduction in wage expenditure led to an increase in sports efficiency. The latter study indicated that an improvement in sports efficiency required not only a reduction in the salaries for players and coaches, but also an increase in the number of points scored in league games. Solberg and Haugen (2009) analyzed the reasons for the low profits made by football clubs despite high revenues: they concluded that in the fight for talented young players European clubs should adopt a more aggressive strategy and spend more money on buying them than clubs on other continents. Advancing to European cups or struggling to avoid a decline led to a push-out effect. Using game theory, they illustrated the mechanisms that led European clubs to spend more money than their budgets allowed.

The DEA model was further developed by Pyatunin et al. (2016) in their article "The economic efficiency of European football clubs—Data Envelopment Analysis (DEA) approach". The authors added two additional models: DEA super efficiency and DEA cross efficiency. The authors took into account clubs from the leading leagues and analyzed both the factors influencing sports and financial efficiency. The results of the research carried out on 48 European clubs showed that both methods can be successfully used to measure the effectiveness of football clubs and to verify what factors affect their effectiveness. Clubs that were among the leading sports clubs were characterized by lower effectiveness due to the large difference in expenditure between them and other clubs. In order to be effective, clubs must combine good financial results with successes in national and international competitions.

The relationship between profitability and football results of European clubs was also investigated by Sánchez, Barajas and Sánchez-Fernánadez (2020). The authors note the emergence of a group of investors who allocate assets both in America and Europe. In previous studies, profitability was not considered the goal of operating in European clubs, but only in American clubs. The article found a negative correlation between financial and sports performance and no impact of sports performance on profitability. So club owners do not have to focus on sports performance and instead pay more attention to maximizing financial performance. Moreover, the authors note that ownership concentration has a negative impact on both sports and financial performance.

There are also studies in the literature on the impact of stock exchange on the finances of football clubs. Thus, Baur and McKeating (2009) analyze the financial results of football clubs that were going through the first public offer. The conclusions of the study were similar to most literature on corporate finance, which indicates that the price of their shares is lower than that for similar companies in the medium term. Football clubs usually had worse financial results after the commencement of trading on the stock exchange. Tiscini and Dello-Strologo (2016) pointed out that the value of a football club could not be estimated on the basis of expected financial results alone. It was necessary to take into account also the general benefits for shareholders represented by private control benefits and socio-emotional benefits.

Conclusions about the relationship between the costs of wages for players and coaches and the revenues and sports successes of football clubs were also drawn by Kern and Süssmuth (2009), who verified the relationship between financial and sports results in German clubs. The Bundesliga was also a source of effectiveness research for Beck and Meyer (2012), who used the difference between goals scored by the home team and goals scored by the guests. Based on over 3,000 matches played in Germany, the authors showed that the ability to achieve satisfactory sport results depended mainly on the individual skills of players, their nationality, age and experience. Frick and Simmons (2007), based on the analysis of the number of points scored by 39 Bundesliga clubs in 1981–2003, showed that trainers' salary influenced the sports results achieved by football clubs. According to these authors, the footballing skills of the players in the team were crucial for the success of German clubs, both sports and financial. Different conclusions were reached by McNamara, Peck and Sasson (2011): based on the example of testing English clubs over a 12-year period, they determined that the managers' ability to assess the potential of players and create a well-functioning team is very important. However, it is also important to remember the importance of the sports potential of players whose skills play a vital role in the manager's work to improve the team's performance.

Barajas, Fernández-Jardón and Crolley (2007) created a composite index (IND), which reflected the structure of revenues of Spanish football clubs on the basis of results in various sports competitions. The authors proved a high correlation between sports revenues and salary costs in Spanish clubs in 1998–2002. In the period they analyzed, salary costs increased up to 70% of the club's total revenues, making Spanish football clubs' profits relatively low. In general, they recognized that financial results did not have a significant impact on sports performance.

DEA was also used to estimate the efficiency of football clubs from other parts of the world. Thus, Soleimani-Damaneh, Hamidi and Sajadi (2011) verified the efficiency of football clubs in Iran. They showed a significant positive correlation between sports performance and the salaries of players and coaches. However, too high salary increases contributed to a reduction of clubs' efficiency.

Previous studies used other methods to analyze the effectiveness of football clubs. McNamara et al. (2011), using the linear regression model, analyzed the clubs' sports results depending on the adopted business model. They noticed that personal stabilization translated into better financial results. Barajas, Fernández-Jardón and Crolley (2007), thanks to the use of linear regression, noticed a high correlation between revenues and sports results of Spanish clubs. Sánchez, Barajas and Sánchez-Fernández (2020), based on linear regression analysis, noticed

that financial results had a negative impact on the sports performance of clubs, while sports performance did not harm profitability. Also, ownership concentration had a negative influence on financial and sports performance. These findings showed that the pursuit of sports success might not affect the profitability and sustainability of clubs. Therefore, investors could focus less on sports performance and more on maximizing financial return on investment. Samagaio, Couto and Caiado (2009) used factor analysis to study the financial situation of English clubs. They noted that a strong correlation between financial and sports performance made managers strive to maximize sports performance at the expense of financial performance, regardless of the ownership structure in the club. On top of this, financial and sports performance correlated with returns on equity but not with risk. Barajas and Rodríguez (2010) used logistic regression to study the financial situation of Spanish clubs. A large part of the analyzed clubs recorded operating losses and the debt exceeded revenues in most cases. The clubs were characterized by low debt repayment capacity and by ineffectiveness in terms of spending on the purchase of new players. An important factor to avoid insolvency is to stay in the top division. Frick and Simmons (2007) used stochastic methods to analyze German clubs and showed that the coaches' salaries affected the sports performance of football clubs. The football skills of players were key to the success of German clubs, both in terms of sports and finance.

The above studies mainly analyzed the relationship between sports results of football clubs and various factors that may influence them. An important goal of football clubs, however, is also to maximize the market value of players and optimize the cost of their wages in relation to their sports achievements. Obviously, the hierarchy of importance of individual goals varies depending on the financial and sports position of a given club. For some clubs analyzed below, player sales are only a tool to achieve the goal of meeting financial fair play requirements. In many cases, the sale of players is dictated only by sports reasons, such as the inability to play in the first team. On the other hand, most of the clubs in the less prosperous leagues sell the best players, hoping to achieve high profits that are necessary for their continued functioning. The negative effects of the arms race of the best football clubs, based on the example of Spanish teams, were presented by Barajas and Rodríguez (2010), who pointed out that in 2009, 9 teams were technically insolvent and were under the supervision of the league, which was due to their excessive spending allocated to new players.

In most cases, the market value of players is correlated with their wages. Acquiring a highly valued player involves both the need to pay a high amount for the transfer of a player and a high salary. The club therefore incurs two types of expenses: the cost of buying a player and his earnings. In some cases, however, clubs acquire a player for free, despite the fact that he presents a very good sports level, e.g. in the case of a short contract with another club, or pay a low amount, e.g. in the case of an advanced age of the player.

Based on the analysis of the literature and knowledge about the functioning of football clubs, 4 variables have been selected as inputs and 4 variables that characterize the effects of the activities of a football club have been identified as results. Thus, the inputs include:
– expenses on players' salaries;
– expenses on club operating activities (operating costs);
– expenses on transfers (net);
– market value of footballers.

The results include:
– weighted number of points scored in league games;
– club market value;
– financial profit generated by the football club in a given season;
– number of points scored in the UEFA ranking.

3. Research procedure

The sources of data subjected of the analysis are as follows: the specialized football portal www.transfermarkt.de, industry rankings provided by professional audit companies: Deloitte and KPMG, and the official website of the European football federation www.uefa.com. The analysis covers 20 clubs that achieved the highest revenues in the 2018/2019 season.

The analysis includes the following stages:
– presentation of financial and sport results of football clubs;
– calculation of performance indicators;
– determining a collective efficiency indicator for each of the analyzed clubs;
– developing a ranking based on the value of the performance indicator.

The basis for the assessment of each club will be the efficiency coefficient, which consists of the values of financial and sports variables in the analyzed period. The efficiency coefficient was calculated for each of the analyzed clubs.

Formula 1. The efficiency coefficient of the football club

$$w_e = \sum_{i=1}^{n} y_i - \sum_{i=1}^{n} x_i$$

where:
$\sum_{i=1}^{n} xi$—total standardized inputs: wages costs (*x1*), operation costs (*x2*), expenses for transfers (*x3*) and market value of players (*x4*)
$\sum_{i=1}^{n} yi$—total standardized effects: points in domestic leagues (*y1*), market value (*y2*), operation profit (*y3*) points scored in UEFA ranking (*y4*).

Weights of individual inputs are consistent with the share of individual categories of expenses in the total amount of club expenses. They are based on the summed values of the variables for all clubs included in the analysis. The higher the value of the above indicator, the greater the club's ability to transform outlays into effects, and therefore the more effective is the club's functioning. Thus, the significance of individual financial categories for the results of the conducted analysis is similar to the significance of these factors for the overall financial situation of a football club. The effects weights are the same for all variables. The target values of the efficiency indicator were determined on the basis of standardized variables. It enables to compare variables that are not expressed in the same units, including league points and UEFA rankings and financial profit expressed in millions of euros. Due to the short period of analysis and the relative stability of money in the analyzed period, the research results were presented in current prices. Standardized values of variables were determined on the basis of the following formula:

$$Z_i = \frac{x_i - \overline{x_n}}{Sx_n}$$

where:

Z_i—standardized value of variable
x_i—the value of the variable for a club
$\overline{x_n}$—average value of the variable for all analyzed clubs
Sx_n—standard deviation of the variable for all analyzed clubs.

Stage 1: input variables

Table 1 presents expenditure on wages in leading European football clubs in the 2014/2015–2018/2019 seasons, expressed in millions of euros. Expenses allocated for this purpose regularly increased—in the 2014/2015 season the average among the analyzed clubs was 177.57 million EUR, and in the 2018/2019 season as much as 234.85 million EUR. In each of the analyzed seasons, FC Barcelona allocated the largest amount to players' salaries.

Table 1. Wages costs in European football clubs (*x1*) from season 2014/2015 to 2018/2019
(in millions of euros)

Team/ year	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019
Real Madrid	254	271	321	344	327
Atletico Madrid	72	84	134	174	176
Bayern Munich	264	287	289	296	324
FC Barcelona	304	320	339	394	421
Juventus Turin	198.4	221.5	261.8	259	327.8
Tottenham	141.23	139.83	147.84	166.55	186.32
PSG	212	224	216	247	264
Manchester City	255.04	264.16	307.21	292.97	304.68
Arsenal London	252.99	261.23	231.92	270.89	225.12
Borussia Dortmund	147	158	174	178	194
Liverpool	219.21	279.42	242.25	297.47	316.45
Manchester United	268.17	321.78	306.43	333.94	354.42
Chelsea London	285.63	310.15	256.98	277.25	291.49
Inter Milan	116.5	124.2	151.3	156	192.6
AS Roma	136.1	155	145	158.8	184.1
Schalke 04	124	122	132	138	154
Bayer Leverkusen	108	116	134	132	146
Sevilla	51	63	73	87	84
Napoli	85.2	85.2	101.6	118.2	138.1
Monaco	57	54	58	74	86

S o u r c e: Author's own elaboration based on Footballbenchmark, 2021.

Table 2 presents expenses which the clubs spent to cover operating costs in the analyzed period. These include expenses related to the organization of football matches, travel, expenses for marketing and training of young players. In most clubs the expenses for operating costs were lower than the amounts allocated for players wages and they increased regularly every season, just like the wages. In the 2014/2015 season, the average operating expenses were 103.82 million EUR, and in the 2018/2019 season—166.82 million EUR. Real Madrid and FC Barcelona allocated the highest amounts for operating activities.

Table 2. Expenses for operating costs in top European football clubs ($x2$) from season 2014/2015 to 2018/2019 (in millions of euros)

Team/ year	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019
Real Madrid	219.4	209.9	284.9	329.6	322.8
Atletico Madrid	75	96.1	117.4	155.4	159.6
Bayern Munich	158.3	207.4	210.8	231.9	224
FC Barcelona	197.8	219.1	220.4	346.2	373.3
Juventus Turin	66.8	78.5	99.7	117.9	142.6
Tottenham	69.57	85.67	115.76	95.55	161.68
PSG	166.6	210	178.8	228.7	234
Manchester City	110.36	131.14	139.69	148.73	187.32
Arsenal London	116.01	115.77	113.18	119.91	157.18
Borussia Dortmund	84.6	93.5	126.2	139.1	164.5
Liverpool	93.29	110.18	110.75	125.43	197.95
Manchester United	109.13	135.02	149.77	145.66	185.78
Chelsea London	140.37	134.35	151.32	167.25	226.51
Inter Milan	117.7	72.8	70.4	74	116.2
AS Roma	60.7	66.6	66.9	69.9	81.2
Schalke 04	86.5	78.3	82.5	101.5	114
Bayer Leverkusen	76	80	87	96	98
Sevilla	45.7	50.9	57.3	64.9	58.8
Napoli	28.2	23.3	28.5	34.4	30
Monaco	54.4	55.5	70.2	88.9	101

S o u r c e: Author's own elaboration based on Footballbenchmark, 2021.

Table 3 presents net expenditure on the purchase of new players. In each of the analyzed seasons, the clubs spent a greater amount on the purchase of players than they earned from the sale of players. The average amount of expenditure on transfers ranged from 17.38 to 49.9 million euros.

Table 3. Net expenses for new players purchasing in top European football clubs (*x3*)
from season 2014/2015 to 2018/2019 (in millions of euros)

Team/ year	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019
Real Madrid	13.3	69.35	−7.5	−88	28.65
Atletico Madrid	53.65	−20.79	35.3	18.5	95.6
Bayern Munich	4.7	56	17.7	84.25	−74
FC Barcelona	84.92	12.7	90.95	142	−4.95
Juventus Turin	35.69	75.37	18.92	18.7	149
Tottenham	4.33	−16.58	31.2	17.7	−5.35
PSG	47.3	93.2	74.7	139.6	113
Manchester City	72.27	140.76	178.15	226.15	24.49
Arsenal London	91.18	24	102.69	−5.15	72.5
Borussia Dortmund	60.4	−22.55	10.1	−151.11	−23.7
Liverpool	52.16	35.95	94.52	−20.62	141.1
Manchester United	146.09	53.93	137.75	152.9	52.15
Chelsea London	−7.11	3.01	24.4	59.9	137.05
Inter Milan	−6.55	−13.07	141.05	58.31	15.5
AS Roma	56.91	−42.17	27.17	−58.85	0.64
Schalke 04	−4.2	−20.1	−16.5	42.2	15.55
Bayer Leverkusen	18.71	−5.25	33.4	−35.9	−13.5
Sevilla	−29.6	−16.45	−9.75	−3.95	−12.2
Napoli	14.35	24.41	−18.12	49.55	−32.3
Monaco	−49.37	−84.09	32.05	−77.1	−181.4

S o u r c e: Author's own elaboration based on Transfermarkt, 1.04.2021.

Table 4 presents the market value of players of the analyzed teams based on the valuation carried out by www.trasfermarkt.de. The presented amounts do not include the market values of players bought and sold within a given season.

Table 4. Market value of players in top European football clubs (*x4*) from season 2014/2015
to 2018/2019 (in millions of euros)

Team/ year	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019
Real Madrid	634.35	631.15	750.6	804.2	1056.65
Atletico Madrid	235.35	356.79	421.6	566.5	776.65
Bayern Munich	559.48	552.5	575.01	526	909.9
FC Barcelona	513.83	605.8	696.25	630.5	1167.5
Juventus Turin	322.01	318.97	403.09	521.83	724.78
Tottenham	294.37	270.33	354.3	517.65	824.95
PSG	338.7	340.1	427.35	441.5	729.4

Manchester City	405.73	311.99	443.25	390.2	1029.76
Arsenal London	313.17	384.6	420.06	639.05	520.8
Borussia Dortmund	269.4	334.15	310.95	600.34	400.5
Liverpool	232.84	289.05	299.63	515.72	759
Manchester United	105.66	225.82	143.5	65.2	222.85
Chelsea London	533.21	712.5	578.65	589.75	909.2
Inter Milan	318.26	310.97	177.8	289.12	570.39
AS Roma	203.6	361.26	258.27	387.14	434.55
Schalke 04	217.58	229.45	255.25	163	228.35
Bayer Leverkusen	147.84	206	211.23	261.3	372.85
Sevilla	152.45	202.95	246.15	273.4	280.7
Napoli	268.58	244.54	322.03	323.09	552.97
Monaco	244.12	236.84	158.4	369.1	567.06

S o u r c e: Author's own elaboration based on Transfermarkt, 2021.

Stage 2: output variables

Table 5 presents UEFA's coefficients, which determine the strength of the football league based on the achievements of its representatives in European competitions.

Table 5. UEFA coefficient in seasons 2014/2015–2018/2019

Team/ season	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019
Premier League	13.571	14.25	14.928	20.071	22.642
German League	15.857	16.428	14.571	9.857	15.214
Spanish League	20.214	23.928	20.142	19.714	19.571
Italian League	19	11.5	14.25	17.333	12.642
French League	10.916	11.083	14.416	11.5	10.583

S o u r c e: Author's own elaboration based on UEFA, 2021.

Table 6 presents the number of points scored in league competitions by leading European teams multiplied by UEFA coefficients for each of the leagues: English, Spanish, German, Italian and French. For example, 68 points Real Madrid scored in the 2018/2019 season multiplied by the UEFA coefficient of 19.571 from Table 5 resulted in 1331 points. Due to the very strong position of the Spanish league on the European market, among the leading teams we will find 3 teams representing La Liga: Real Madrid, Atletico Madrid and FC Barcelona. The English Premier League, on the other hand, includes a rather high number of first-rate teams. Therefore, the English clubs had more difficulty in scoring a high number of points than teams from the Italian, French, German or Spanish leagues. There are more high-level clubs in the Premier League and even lower-ranked clubs have high budgets and excellent players.

Table 6. Weighted number of points (*y1*) in national league from season 2014/2015 to 2018/2019

Team/ year	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019
Real Madrid	1859.69	2153.52	1873.21	1498.26	1330.83
Atletico Madrid	1576.69	2105.66	1571.08	1557.41	1487.40
Bayern Munich	1252.70	1445.66	1194.82	827.99	1186.69
FC Barcelona	1900.12	2177.45	1812.78	1833.40	1702.68
Juventus Turin	1653.00	1046.50	1296.75	1646.64	1137.78
Tottenham	868.54	997.50	1283.81	1545.47	1607.58
PSG	906.03	1063.97	1254.19	1069.50	963.05
Manchester City	1072.11	940.50	1164.38	2007.10	2218.92
Arsenal London	1017.83	1011.75	1119.60	1264.47	1584.94
Borussia Dortmund	729.42	1281.38	932.54	542.14	1156.26
Liverpool	841.40	855.00	1134.53	1505.33	2196.27
Manchester United	949.97	940.50	1030.03	1625.75	1539.66
Chelsea London	1180.68	855.00	1388.30	1404.97	1630.22
Inter Milan	1045.00	770.50	883.50	1247.98	872.30
AS Roma	1330.00	920.00	1239.75	1334.64	834.37
Schalke 04	761.14	854.26	626.55	620.99	502.06
Bayer Leverkusen	967.28	985.68	597.41	542.14	882.41
Sevilla	1536.26	1244.26	1450.22	1143.41	1154.69
Napoli	1197.00	943.00	1225.50	1577.30	998.72
Monaco	775.04	720.40	1369.52	920.00	380.99

S o u r c e: Author's own elaboration based on Transfermarkt, 2021.

Table 7 below presents the market value of leading European clubs according to the methods adopted in the report "The European elite" developed by the consulting company KPMG. From the 2014/2015 season to 2018/2019, there was a regular increase in the value of the clubs analyzed. In the 2016/2017 season, Manchester United was the first club to exceed the value of 3 billion euros, and in the 2018/2019 season Real Madrid was the second club to exceed this value. Both clubs competed in the entire period for the title of the highest-rated football team in the world. The exceptionally high value of the two clubs is the outcome of both their superb sports achievements and huge recognition around the world. However, it is worth noting that often football clubs that otherwise achieved very good sports results were of lower value than clubs that won the national championship or won the Champions League.

Table 7. Market value of European football clubs (*y2*) in years 2014/2015–2018/2019
(in millions of euros)

Team/ year	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019
Real Madrid	2894	2905	2976	2920	3224
Atletico Madrid	548	592	793	900	1004
Bayern Munich	2138	2153	2445	2552	2696

FC Barcelona	2742	2758	2765	2783	2676
Juventus Turin	956	983	1218	1302	1548
Tottenham	748	801	1011	1286	1679
PSG	788	843	998	1142	1315
Manchester City	1541	1620	1979	2160	2460
Arsenal London	1598	1663	1956	2102	2008
Borussia Dortmund	795	830	971	1060	1085
Liverpool	1249	1273	1330	1580	2095
Manchester United	2884	2905	3095	3255	3207
Chelsea London	1418	1453	1599	1765	2227
Inter Milan	378	399	429	491	692
AS Roma	347	358	453	455	516
Schalke 04	603	624	691	673	765
Bayer Leverkusen	548	571	584	624	658
Sevilla	173	181	261	316	352
Napoli	381	394	409	518	569
Monaco	174	195	218	259	255

S o u r c e: Author's own elaboration based on Footballbenchmark, 2021.

Figure 1 presents the dependence between weighted number of points in national leagues and the market value of European football clubs. In most cases there is a positive correlation between these variables. The Spearman correlation coefficient is 0.58.
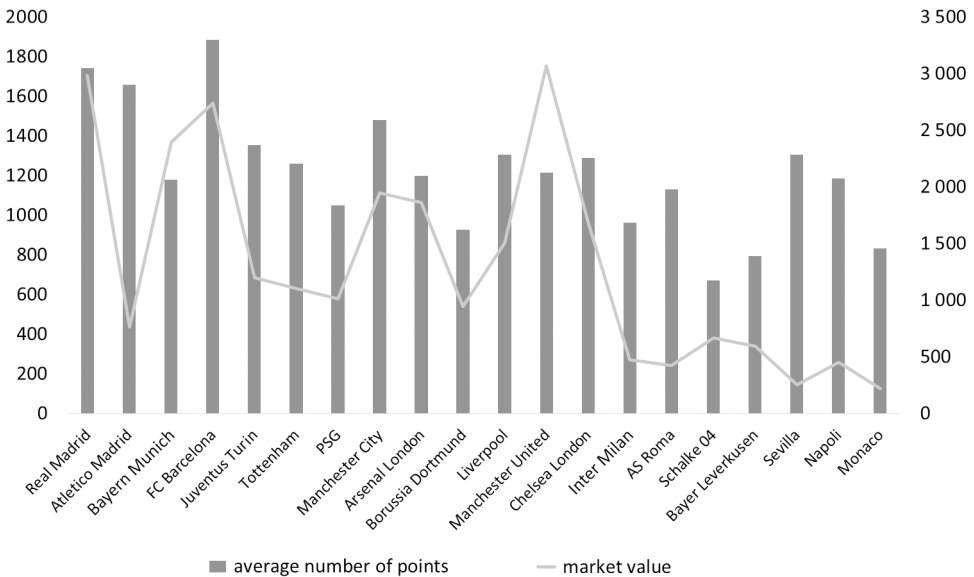

Figure 1. Average weighted number of points in domestic leagues vs market value of teams (in millions of euros) in years 2014/2015–2018/2019

S o u r c e: Author's own elaboration.

Table 8 presents financial profits achieved by leading European clubs expressed in millions of euros. The total financial profit of all the analyzed clubs increased from 811.92 million EUR in the 2014/2015 season to 959.95 million EUR in the 2018/2019 season. The best, however, was the 2016/2017 season in which the total profit of the analyzed clubs amounted to 1253.63 million EUR. This gives us the average profit of 62.68 million EUR. Manchester United was the top club in terms of financial gain in 2014–2019.

Table 8. Operational profit of European football clubs (*y3*) in years 2014/2015–2018/2019
(in millions of euros)

Team/ year	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019
Real Madrid	101.7	138.5	65.2	69	90.5
Atletico Madrid	28.1	49	43	−18	35.7
Bayern Munich	51.8	51.7	97.6	88.1	101.3
FC Barcelona	58.9	76.9	83.1	−51.1	45.1
Juventus Turin	26.9	59.2	38.7	49.7	23.1
Tottenham	44.71	59.78	102.48	162.55	29.06
PSG	98.6	93.3	89.9	60.1	69.4
Manchester City	98.16	129.11	107.16	127.14	64.47
Arsenal London	66.81	92.13	143.18	49.42	55.22
Borussia Dortmund	38.6	49	33.2	32.5	0.1
Liverpool	81.66	17.88	74.53	94.13	60.21
Manchester United	143.14	231.91	220.54	187.58	128.19
Chelsea London	−5.76	4.43	21.24	65.08	45.1
Inter Milan	−66	−14.4	41.1	50.7	57.3
AS Roma	−29	−16.1	−2.2	−36.9	22.2
Schalke 04	27.1	8.6	18.4	16.9	69
Bayer Leverkusen	18.4	14.9	15.8	12.8	27.4
Sevilla	−8.2	5.5	10.3	13.3	−3.5
Napoli	31	12.5	34.7	71	30.3
Monaco	5.3	−32.3	15.7	−39.3	9.8

S o u r c e: Author's own elaboration based on Footballbenchmark, 2021.

Table 9 illustrates the number of points scored by leading European clubs in the 2014/2015–2018/2019 seasons in the UEFA ranking. The ranking confirms the dominance of Spanish clubs that had won the Champions League four times and the European League three times. Real Madrid was the best club in terms of sports results during this period. The club collected a total of 146 points, winning the title of the best team in Europe 3 times. The next places in the ranking were won by FC Barcelona, Bayern Munich and Atletico Madrid.

Table 9. Points obtained in UEFA rank (*y4*) from season 2014/2015 to 2018/2019

Team/ year	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019
Real Madrid	29	33	33	32	19
Atletico Madrid	22	28	29	28	20
Bayern Munich	28	29	22	29	20
FC Barcelona	34	26	23	25	30
Juventus Turin	29	18	33	23	21
Tottenham	9	12	10	21	26
PSG	21	24	20	19	19
Manchester City	15	26	18	22	25
Arsenal London	20	15	19	21	26
Borussia Dortmund	18	17	22	10	18
Liverpool	10	22	0	30	29
Manchester United	0	13	26	20	19
Chelsea London	21	18	0	18	30
Inter Milan	12	0	4	0	15
AS Roma	12	14	13	25	17
Schalke 04	17	18	11	0	17
Bayer Leverkusen	18	14	18	0	11
Sevilla	28	23	19	21	13
Napoli	22	13	17	10	18
Monaco	21	5	25	6	5

S o u r c e: Author's own elaboration based on UEFA, 2021.

Figure 2 presents the dependence between the average cost of wages (presented in Table 1) and the average number of points in UEFA rank from season 2014/2015 to 2018/2019. As a rule, clubs that spent more money on salaries obtained better results in international competitions. The Spearman correlation coefficient is 0.56.
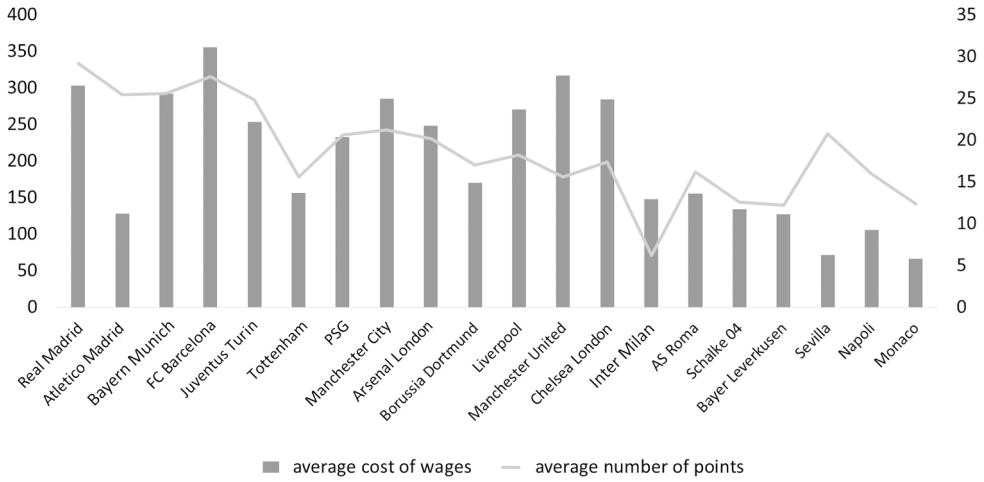
Figure 2. Average costs of wages (in millions of euros) and average number of points in UEFA rank
in seasons 2014/2015–2018/2019

S o u r c e: Author's own elaboration.

Stage 3

In the next stage, the efficiency coefficient was calculated for each of the analyzed clubs in accordance to the previously presented Formula 1.

$$w_e = \sum_{i=1}^{n} y_i - \sum_{i=1}^{n} x_i$$

The results are presented in Table 10 below.

Table 10. The values of the efficiency coefficients of football clubs
in the 2014/2015–2018/2019 seasons

Team/ year	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019
Real Madrid	−0.15	0.15	−0.48	−0.81	−0.63
Atletico Madrid	0.84	0.42	0.43	−0.25	−0.26
Bayern Munich	−0.63	−0.35	−0.50	−0.21	−0.18
FC Barcelona	0.01	−0.40	−0.60	−1.04	−1.03
Juventus Turin	0.53	0.05	0.14	0.02	−0.57
Tottenham	−0.27	0.15	0.20	0.68	0.06
PSG	−0.36	−0.02	−0.26	−0.42	−0.48
Manchester City	−0.44	0.53	−0.39	0.90	0.03
Arsenal London	−0.18	−0.05	0.22	−0.41	0.88
Borussia Dortmund	−0.16	0.05	−0.04	−1.06	0.04
Liverpool	−0.12	−0.02	−0.41	0.27	0.55
Manchester United	0.53	1.01	1.44	2.02	1.73

Chelsea London	−1.29	−1.37	−1.27	−0.43	−0.10
Inter Milan	−0.86	−0.67	−0.21	0.06	−0.18
AS Roma	−0.05	−0.43	0.03	0.13	−0.05
Schalke 04	0.05	0.25	−0.27	−0.02	0.64
Bayer Leverkusen	0.46	0.20	−0.10	−0.33	0.01
Sevilla	1.25	0.53	0.69	0.61	0.34
Napoli	0.58	0.19	0.39	0.69	0.11
Monaco	0.24	−0.22	1.01	−0.38	−0.95

S o u r c e: Author's own elaboration.

Stage 4

The last stage of the analysis consisted in the creation of a ranking of clubs in accordance with the performance indicator. The total performance indicator is the sum of the club's performance indicators in specific seasons. Manchester United reached the highest rate as its performance in the analyzed period was excellent in financial terms. The club maintained its position as one of the highest-rated football clubs in the world, and regularly obtained high financial profit. Despite the lack of sports successes comparable to those achieved many years ago, the club is still one of the richest in the world. Sevilla came the second in the ranking, mainly due to very good sports results achieved at relatively low expenditure. The club had won the European League twice in the analyzed period, despite competing with clubs with more valuable players and higher revenues. The top three is supplemented by Napoli, which did not achieve significant sports successes, but compared to other analyzed clubs had players with lower market value and spent less on players' salaries and operational activities. FC Barcelona was among the teams with the worst performance indicator, mainly due to very high salary costs and lower than expected results in the Champions League. The club that stood out due to poor sports performance in relation to outlays was Inter Milan, which was promoted to the Champions League only in the 2018/2019 season. The lack of international success also translated into the low position of PSG, whose greatest success in the analyzed period was only the Champions League quarter-final. It is worth noting that the club has invested a very high amount to buy new players. The lowest efficiency index was achieved by Chelsea, which presented an irregular sports shape and had poor financial results in the analyzed period.

It should be noted that the results obtained concern only the leading European clubs and in a relatively short period. In further research, it is advisable to take into account a longer time range and other variables that indicate the financial situation of the club, e.g. revenues and market value of players. Moreover, it is advisable to research more clubs and compare the situation of clubs in different European markets.

Table 11. Performance indicator of top European football clubs

Position	Football club	Total performance indicator
1	Manchester United	6,73
2	Sevilla	3,41
3	Napoli	1,96
4	Atletico Madrid	1,18
5	Tottenham	0,82
6	Schalke 04	0,64
7	Manchester City	0,63
8	Arsenal London	0,46
9	Liverpool	0,27
10	Bayer Leverkusen	0,25
11	Juventus Turin	0,17
12	Monaco	–0,30
13	AS Roma	–0,36
14	Borussia Dortmund	–1,17
15	PSG	–1,54
16	Inter Milan	–1,85
17	Bayern Munich	–1,87
18	Real Madrid	–1,91
19	FC Barcelona	–3,06
20	Chelsea London	–4,45

S o u r c e: Author's own elaboration.

4. Conclusion

Effective use of resources is very important for football clubs competing at the highest level. Most football games have been dominated in recent years by clubs with the highest budgets and those with the highest-rated players. In some cases, clubs with higher budgets and players with higher market value lost in competition with clubs with less financial and sports resources. Among the leading football clubs one can distinguish both those that did better in sports competition, and those that outperformed their competitors with greater financial results. You can also point to clubs in which investments in the development of the football team did not contribute to the expected sports successes. Based on the performed calculations, it should be stated that Hypothesis 1 has been positively verified. Football clubs that spent relatively more on football-ers' salaries and operational activities were more successful than their competitors in national and international competitions. Hypothesis 2 has been falsified—clubs with a strong international position such as Real Madrid, FC Barcelona, and Bayern Munich took a low position in the efficiency ranking. Hypothesis 3 has also been falsified. The sports and financial results of

some clubs, such as Sevilla, Atletico Madrid and Napoli, confirm that good resource management allows for effective competition with clubs with greater financial possibilities.

Constant investment in team development is an easiest way to maintain a competitive advantage and successfully compete for sporting successes on the domestic and international markets. Furthermore, some examples indicate that human resources, effective management and know-how allow to overcome financial disadvantage.

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Związek między sportem a wynikami finansowymi w czołowych europejskich klubach piłkarskich

Abstrakt: Liga Mistrzów to od kilkudziesięciu lat najbardziej elitarne rozgrywki piłkarskie w Europie. Osiąganie sukcesów sportowych znacznie ułatwiają klubom piłkarskim uczestniczącym w rozgrywkach Ligi Mistrzów bardzo dobre wyniki finansowe, które pozwalają przeznaczać niemałe kwoty na zakup piłkarzy i na ich wynagrodzenia. Łączna wartość rynkowa piłkarzy znajdujących się w składzie niektórych drużyn przekroczyła w sezonie 2018/2019 1 miliard euro. W artykule został zweryfikowany związek między wynikami finansowymi a wynikami sportowymi w rozgrywkach krajowych i międzynarodowych w sezonach 2014/2015–2018/2019. Za pomocą opracowanego przez autora modelu została zweryfikowana efektywność klubów piłkarskich będących przedmiotem badania. Ponadto przedstawiona została dynamika zmian zysków, wydatków na wynagrodzenia i działalność operacyjną, a także wartości rynkowej wybranych europejskich klubów piłkarskich. Wyniki analizy pozwoliły na wskazanie klubów piłkarskich, których działalność charakteryzuje się najwyższą efektywnością. Na podstawie przeprowadzonej analizy należy stwierdzić, że zarówno wartość rynkowa piłkarzy, jak i wydatki na ich wynagrodzenia miały znaczący, pozytywny wpływ na wyniki sportowe. Wśród czołowych europejskich klubów piłkarskich można jednak wyróżnić takie, które funkcjonowały zdecydowanie skuteczniej niż ich rynkowi konkurenci. Sukcesy sportowe przyczyniają się do zwiększenia wartości rynkowej piłkarzy, ale wiążą się także z koniecznością przeznaczenia większych kwot na wynagrodzenia zawodników.

Słowa kluczowe: wynik finansowy, koszty operacyjne, wartość rynkowa, koszty wynagrodzeń, wynik sportowy