


Season 2016/2017

Capstone Project:

Analysis of European Football Club's
Squad Value

Case Study: Arsenal F.C.





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SUMMARY








What is the relation between the worth of a European football club's squad and its performance during the season? Why did Arsenal F.C. performed poorly during the 2016/2017 season?

European football clubs compete every season in their domestic leagues to reach top spots to qualify to the European Champions League tournament. This capstone project will analyze clubs in the top five leagues in Europe using data science techniques to see if a squad's market values is correlated with reaching top seeds.

The data suggests, Arsenal was one of the year's biggest disappointments. Despite having the sixth most valuable squad in Europe, the English club failed to qualify to the Champions League. This report will look more closely at their numbers and history and will recommend the dismissal of their manager Arsène Wenger.

AVAILABLE DATASETS

Data was collected from two source: Trasnfrmark.com using excel spreadsheets and football-data.org through API. The table below shows the table collected and their headings. All of the code may be found on: <https://github.com/gpguerra7/Springboard-Exercises/blob/exercises/Capstone%201/Capstone%201.ipynb>

Source	Table	Fields
	League Market Values	Club(s), Squad, Age, Foreign players, Total market value, ø Market value
	Arsenal	#, Player(s), Position, born/age, Nat., Current club, Height, Foot, In the team since, before, Contract until, Market value
	Arsenal History	Season, Total market value, Matches, Wins, Draws, Losses, Points
	Leagues	league_id, league_name, league, number_of_teams
	Clubs	crestUrl, id, name, shortName, league_id
	Standings	Away, Draws, Away Goals, Away Goals Against, Away Losses, Away Wins, Home Draws, Home Goals, Home Goals Against, Home Losses, Home Wins, crestURI, draws, goalDifference, goals, goalsAgainst, league_id, losses, playedGames, points, position, teamName, wins
	Players	contractUntil, dateOfBirth, id, jerseyNumber, marketValue, name, nationality, position, team_id

Final Dataset

After data wrangling, collected data was sorted and fitted into the following tables:

Top Leagues	
Column Name	Sample Data
League ID	426
League Name	Premier League
Number of Teams	20
Country	United Kingdom

Top Leagues	
Column Name	Sample Data
Team ID	1
Team Name	1. FC Köln
Team Value Mill. €	112.85
League ID	430
League Name	1. Bundesliga
Country	Germany

Standings	
Column Name	Sample Data
Position	1
Team Name	Chelsea FC
Wins	27
Draws	3
Losses	5
Goals	76
Goals Against	32
Goal Difference	44
Points	84
Home Wins	15
Home Losses	2
Home Draws	0
Home Goals	47
Home Goals Against	16
Away Wins	12
Away Draws	3
Away Losses	3
Away Goals	29
Away Goals Against	16
Crest	http://upload.wikimedia.org/wikipedia/de/5/5c/..

Final Dataset

Players	
Column Name	Sample Data
Player Id	839
Name	Örjan Nyland
Position	Keeper
Market Value	None
Date of Birth	9/10/1990
Contract Until	6/30/2019
Nationality	Norway
Team ID	31
Jersey Number	1
Team Name	FC Ingolstadt 04
League Name	1. Bundesliga

Summary	
Column Name	Sample Data
Position	1
Team Name	FC Bayern München
Wins	25
Draws	7
Losses	2
Goals	89
Goals Against	22
Goal Difference	67
Points	82
Team Value Mill. €	542.65
League Name	1. Bundesliga
Champions League	Yes

Arsenal History	
Column Name	Sample Data
Season	2009/2010
Total market value	281
Matches	38
Wins	23
Draws	6
Losses	9
Points	76

LIMITATIONS:

There are number of limitations due to insufficient data, not freely accessible. It is important to note, that there are many other factors, such as coaching abilities, player injuries and suspensions that will not be discussed. Also, players' market values are current as of writing this paper and are not necessarily related to their transfer price. In other words, a player may have cost more at the time a club purchased him, but due to underperformance the current market value may be much lower. Since this information is not freely available, and for simplicity, the project will only see squad value and its relationship to winning, losing, and finishing a certain position at the end of a season.

The results will hopefully allow a club to see how well they perform in comparison to other teams in relation to market values.

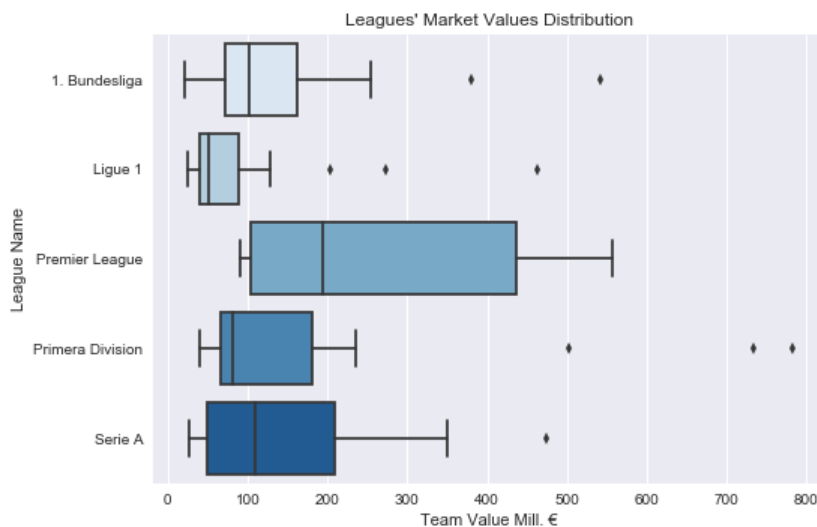
It is also important to note that a team's squad value may increase due to simply winning games rather than the other way around (where value translate to winning), so drawing concrete conclusions from this analysis would be futile. This is due to the nature of parameters (winning, loosing, goals, etc) which are some highly correlated and not independent from each other.

The results are more intended to find the right questions to ask in order to further analyze a more specific topic, such as what happened to Arsenal F.C. during the 2016/2017 season?

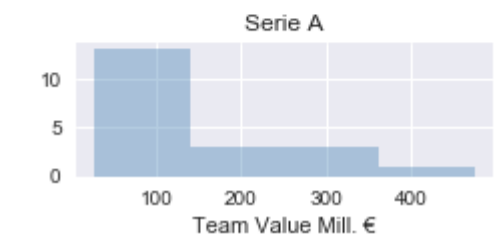
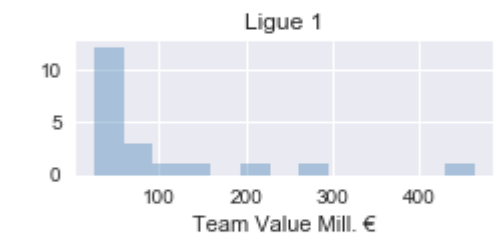
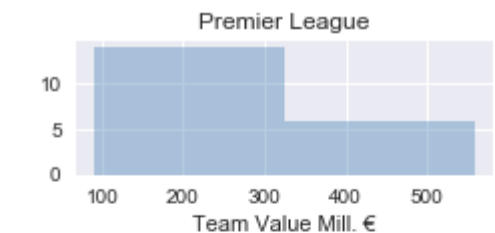
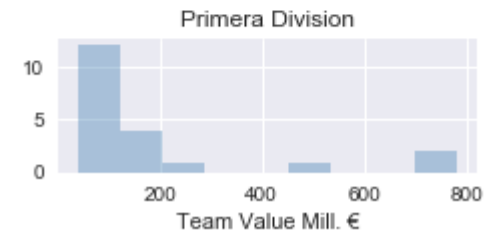
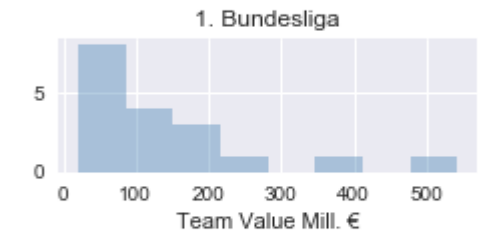
TOP 5 EUROPEAN LEAGUES STATISTICS:

The distribution of the team market values are skewed to the right. The Premier League appears to have a more even distribution whereas the other leagues have a few teams worth more than the rest.

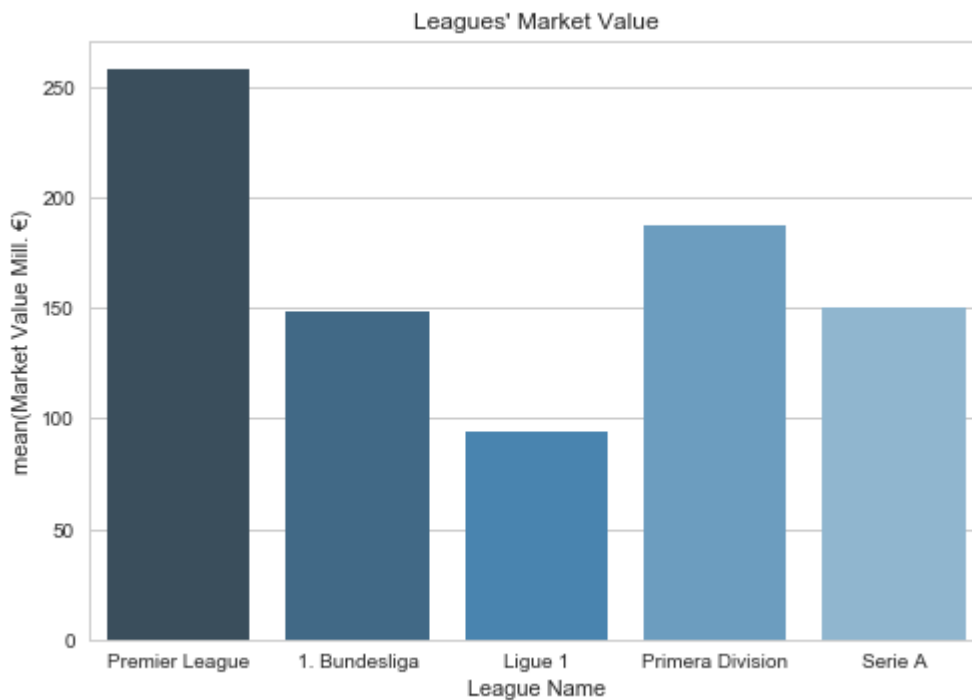
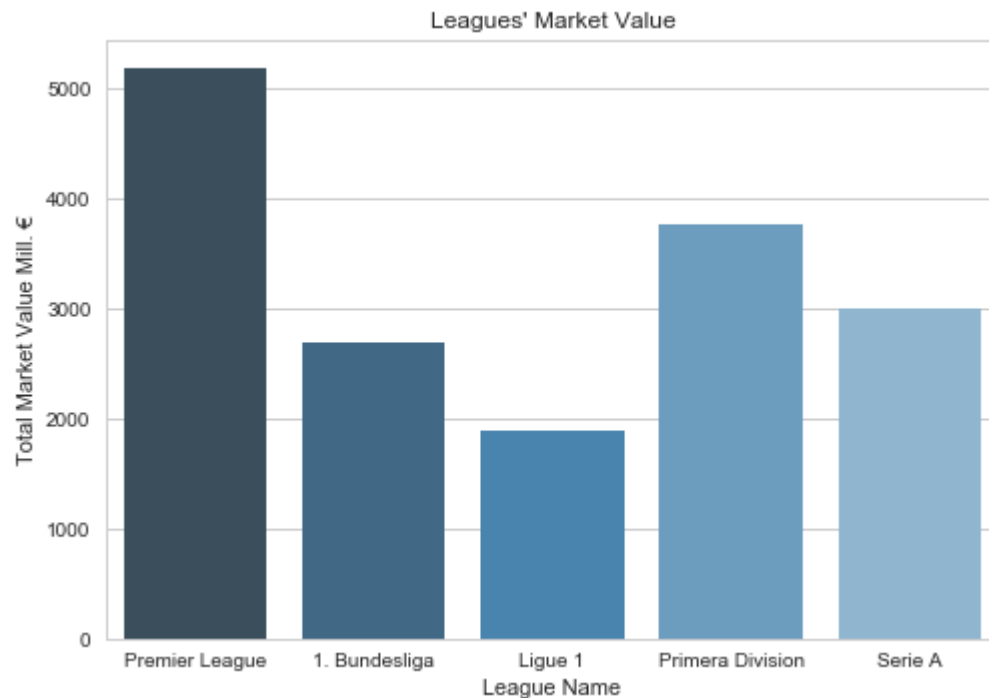
All of the leagues except for the Premier League has outliers. Primera Division has two extreme outliers (Real Madrid & Barcelona) which are worth more than any other team in Europe.



League	Clubs	Mean Team Value Mill. €	Champions League Spots
Premiere League	20	258.71	4
Primera Division	20	187.91	4
1. Bundesliga	18	148.81	4
Serie A	20	150.09	3
Ligue 1	20	94.65	3



The Premier League's players are worth far more than the rest of the other leagues with Primera Division coming in second. Since 1. Bundesliga has 18 teams (two less than the other leagues), a bar plot reflecting average values is also shown below. Using average values, the Premier League, still remains the most expensive league in terms of team value, with Primera Division, Serie A, 1. Bundesliga, and Ligue 1 following in order.



UEFA CHAMPIONS LEAGUE TEAMS:

There is a clear difference in squad values between clubs that made to next year's Champions League tournament and those that did not.

Squad Value Mean Differences

Qualified to Champions League or
playoff round:

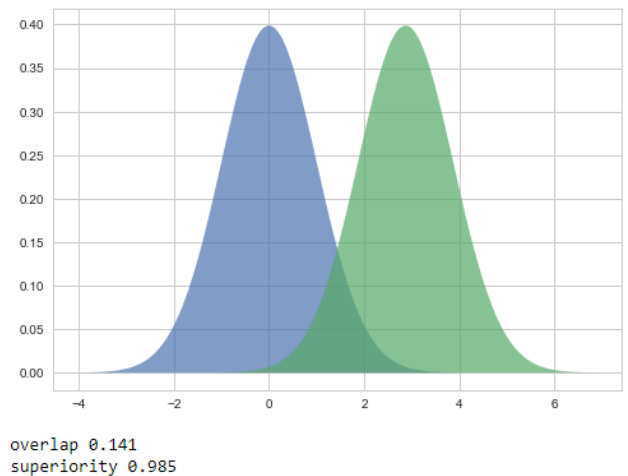
Mean: 420.36€ million

Not Qualified to Champions League:

Mean: 107.83€ million

Difference in means: 312.53€ million

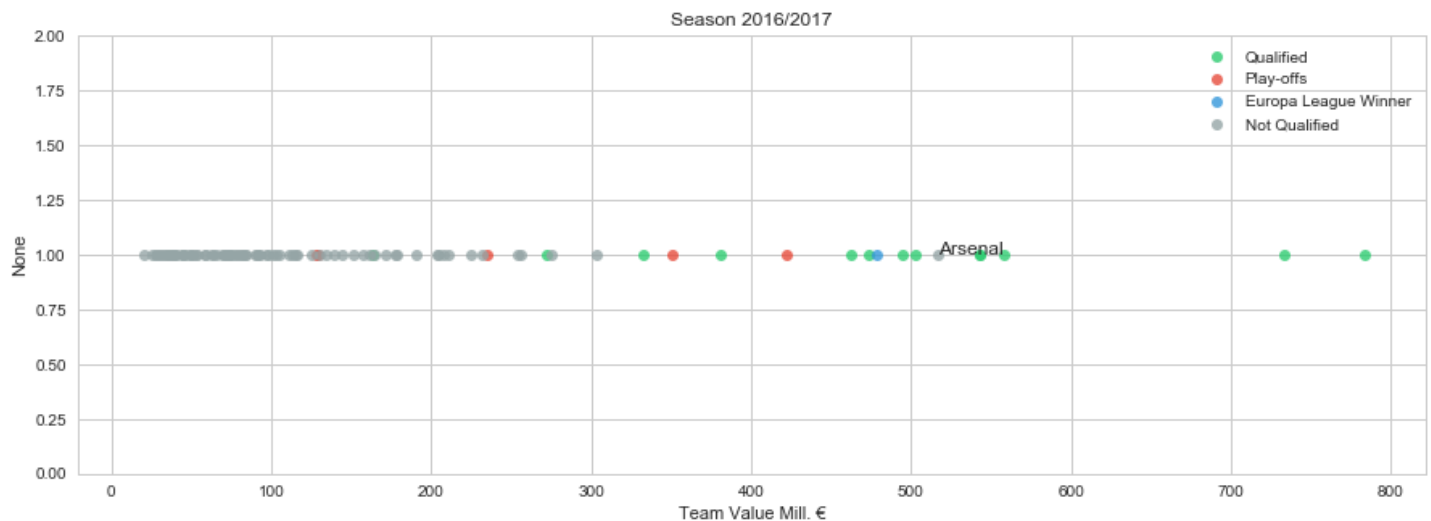
Cohen's D: 2.87



14.2% of teams would be misclassified if you tried to use squad value to guess if a team qualifies to CL.

95 percent chance that the mean difference in team values is within: (222.65, 402.41) with margin of error of 89.88€ million.

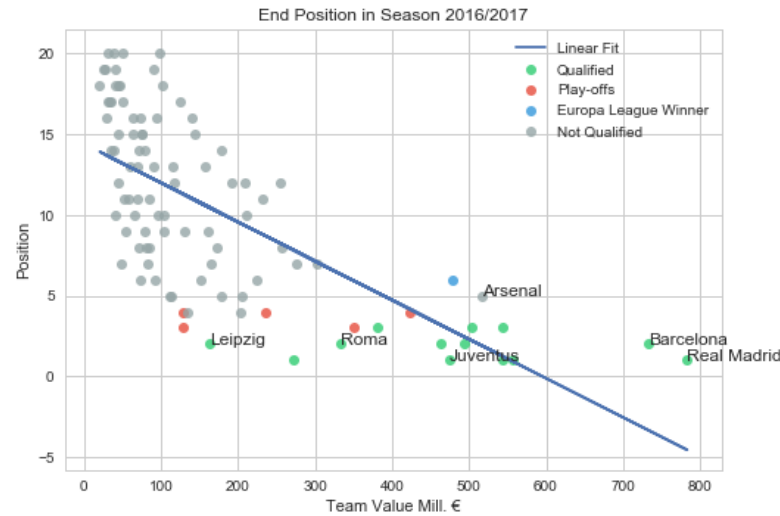
Testing a null hypothesis that the squad value means of clubs that qualify to CL and those that do not are equal, we get a t-statistic of 11.313 and a p-value ≈ 0 .



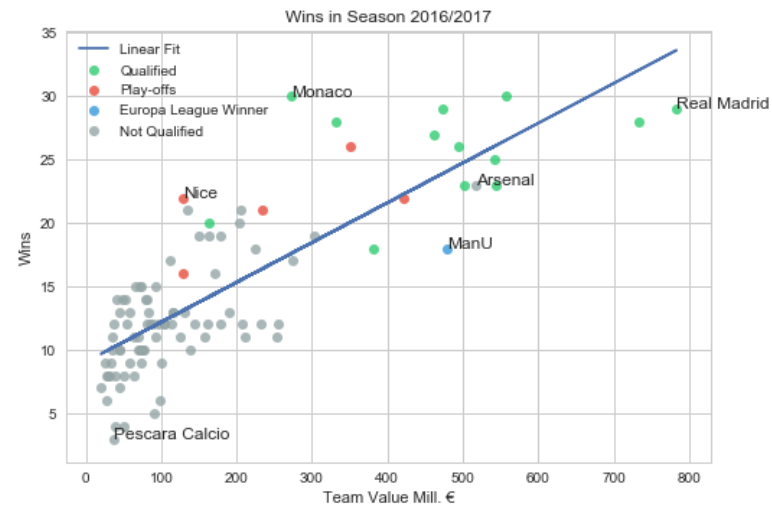
There is a correlation between a club's market value of its players and how high they finish in position in their domestic league. Arsenal is the only club worth more than 300€ million in the Premier not to reach the Champions League. In fact, all clubs in Europe worth over 330€ million, except for Arsenal FC have qualified or made the play-off round for the Champions League. Manchester United finished one position lower than Arsenal, but qualified by winning the Europa League.

In terms of winning games, AS Monaco seems to be the most effective team, having won 30 games with a team value of 272€ million. OGC Nice looks like the team revelation of the season winning 23 games with a team worth less than 130€ million.

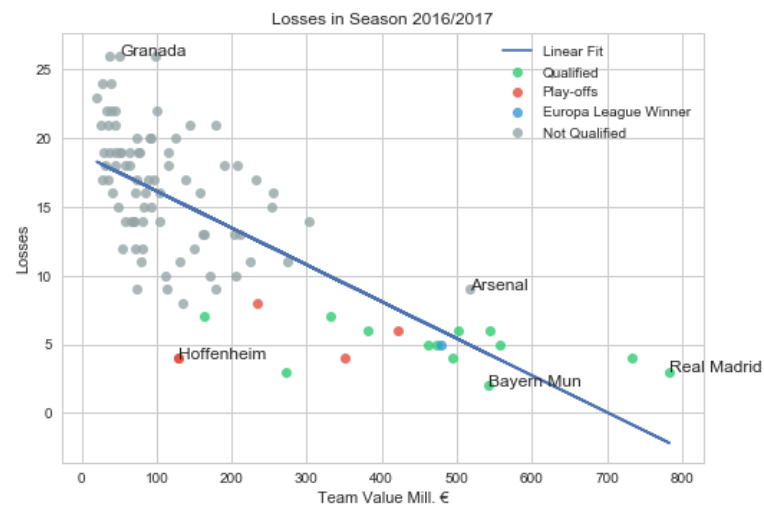
Regarding losees, again, Arsenal FC stands out for losing the most games (9) for teams worth over 350€ million. OGC Nice and TSG 1899 Hoffenheim only lost 4 games with teams worth less than 140 million.



correlation coefficient: -0.7



correlation coefficient: 0.81

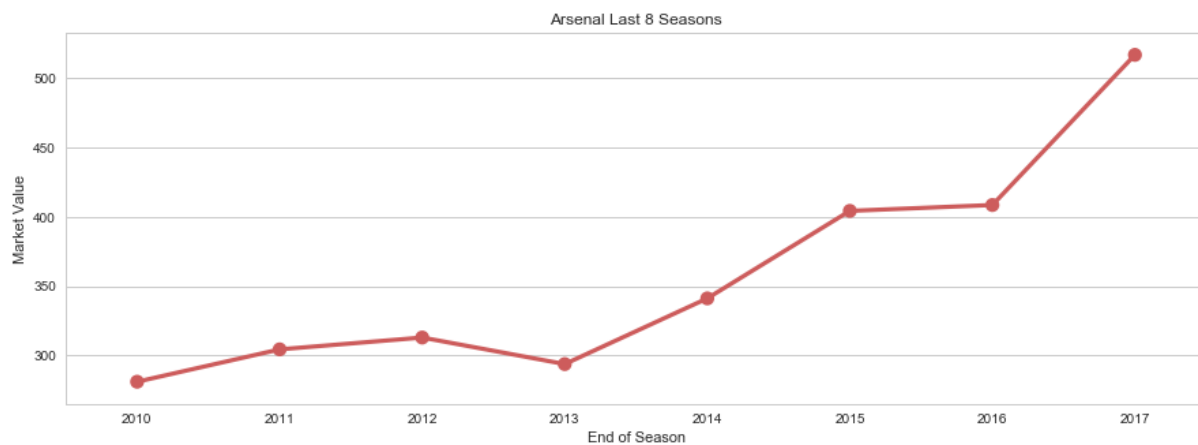


correlation coefficient: -0.72

	Arsenal FC	Club > 350 Mill. €
Position	5	2.46
Wins	23	24.92
Draws	6	7.77
Losses	9	4.69
Goals	77	83.85
Goals Against	44	33.00
Goal Difference	33	50.85
Points	75	82.54
Team Value Mill. €	517	517.37
Champions League	No	Yes

ARSENAL F.C.

Arsenal is a clear outlier with respect to other clubs of similar values. Given its squad value, the club should have qualified to the Champions League, but instead underperformed in all parameters. The graphs below displays the club's performance in the last eight years, to put some perspective. The club's squad value has increased over 60% percent in the last eight seasons, but performance remains steady. This could be a result of a tendency of increasing market values of players across European football. However; if the club's strategy has been to invest heavily to achieve better results, rather than remain where they are, the club must seriously rethink its buying or managerial approaches.



ARSÈNE WENGER

At Arsenal, club manager Arsène Wenger, has a lot of say in player transfers. In fact, the Daily Mail reported last May, “Arsenal manager Arsene Wenger will be given the final say on transfers even if the Gunners appoint a new director of football next season.” Wenger’s number may not be declining, but the fact that the club did not make it to the Champions League, suggests the Premier League is increasingly becoming more competitive. With players worth over 500€, Wenger last season at Arsenal, was a failure.

RECOMMENDATIONS

Arsenal should terminate Arsène Wenger, given his track record over the last years with an increasingly valuable team. The club should also look at the following clubs and their managers for possible substitutions:

AS Monaco, OGC Nice, Red Bull Leipzig, TSG 1899 Hoffenheim, and AS Roma.

SOURCES:

"European Leagues and Cup Competitions." *Transfermarkt*. N.p., n.d. Web. 12 July 2017.

Football-data.org - Ur Src for Machine Readable Football Data. N.p., n.d. Web. 12 July 2017.

MailOnline, Sami Mokbel for. "Arsenal Manager Arsene Wenger Will Be given the Final Say on Transfers Even If the Gunners Appoint a New Director of Football next Season." *Daily Mail Online*. Associated Newspapers, 11 May 2017. Web. 12 July 2017.