

# Arsenal - Over the years

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## I. DATA STORY SUMMARY

Football is a team sport that brings people together in the spirit of unity. Arsenal performs in the first tier of the UK's football pyramid and is one of the world's top ten most famous clubs, based in North London, with 81.2 million fan base [1]. The football club comprises a Board of directors, operations staff and players, who share overall success. The operations team consists of the CEO, technical director, manager, scouts, and contract negotiators who scrutinise player acquisitions.

In the data narrative, to address Arsenal's performance to its supporters, the club's on-field performance of the last twenty-five seasons was analysed using points secured, managerial changes, wins, draws, defeats, and league places to examine the influence of each element on overall performance. The number of points secured indicates the type of on-field performance that transpired. Significant changes such as stadium relocation, trophies, operating model, and managers influence on club status were explored to discover elements that contributed to the club's success and failure over the years. The club owner's investment is examined for comprehending the goals and the club's business model. Aspects of football operations such as player acquisitions, net expenditure, and wage bill were investigated to establish their impact on clubs' transfer market performance. Trophies and tenure of the preceding five managers are reviewed to assess the impact on sporting performance.

The player transfers of six significant clubs were examined based on player metrics per position regarding assists, goals, successful passes, interceptions, clearances, clean sheet, and saves to compare Arsenal's performance to other teams during the last five years. Transfers are graded as flop, average, good, or successful, identifying the impact of critical decisions in player acquisitions. Net spending and wages of the top five clubs are studied to reflect Arsenal's contract negotiators effectiveness. The relationship between club performance and football operations was explored, with the club's market worth over a decade to demonstrate the team's efficacy. Club's market worth is determined by the club's prospects, player age, performance, injury vulnerability, general development of transfer prices, specific transfer modalities, and situational variables. [4].

## II. DATASET SUMMARY

Story's data is sourced from Kaggle, betting site football-data, and transfermarkt. Kaggle is used to aggregate play information and performance statistics. The betting site retrieves club statistics such as wins, defeats, draws, managers, and goal difference. Arsenal's trophy haul, financial information,

transfer expenditure, wage bill, net spend, and trophies are gathered from the transfermarkt.

Data is preprocessed using pandas in Python to characterise player acquisitions as a flop, average, good, or success based on the player's performance and age of the Premier League's six major teams. Transfers were characterised by Transfer rating and resale rating, both on a scale of four.

## III. VISUALISATIONS

### A. Bar graph depicting Arsenal's 25 seasons on-field performance

1) *Description:* Fig 1 illustrates Arsenal's points total from 1996/97 to 2020/21 season. A text description on the bar reflects the league position for the season, and colour characterises the manager. Filters on manager and season provide depth to the graph, comparing seasons and managers. Hovering over each bar displays manager, goals, wins, losses, goal difference, league position, and points earned. Charts reveal that Arsene was the longest serving manager in the past 25 years and is the longest-serving manager in the club's and premier league history [2]. Arsenal's points tally has steadily declined since 2006, resulting in a consistent finish outside the top 4 from the 2016/17 season.

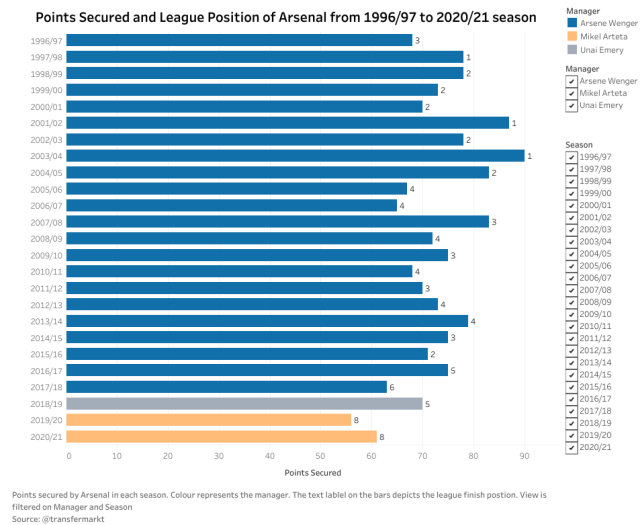


Fig. 1. Points and League position of last 25 seasons

2) *Justification:* The visualisation's goal is to depict the on-field performance of Arsenal with parameters points secured and league position, as points secured are connected to league position. The horizontal bar graph is favoured over treemaps as it works well with categorical variables (seasons) and portrays each season succinctly with the bars [6]. The

football team's performance is analysed for 25 years to reflect the repercussions of activities as the squad passes through numerous management and team-building phases.

3) *Narrative Design Pattern*: Fig 1 utilises addressing the audience to build the story [5] and compare pattern [5] to effectively present Arsenal's points and league position in each season to facilitate comparisons between the seasons.

4) *Strength and Weakness*: The categorical variables season, league position and points are represented clearly for 25 years. Bar plot with many bars leads to a complicated and ambiguous user experience [6]. The graph is supplied with filters on manager and season, allowing comparisons in multiple seasons' performance and overcoming the clutter.

5) *Improvements*: The statistics on goal attempts by and against Arsenal and possession percentiles would add depth to the information provided regarding Arsenal's performance on matchday.

## B. Pie and bar charts showcasing last 5 managers accomplishments

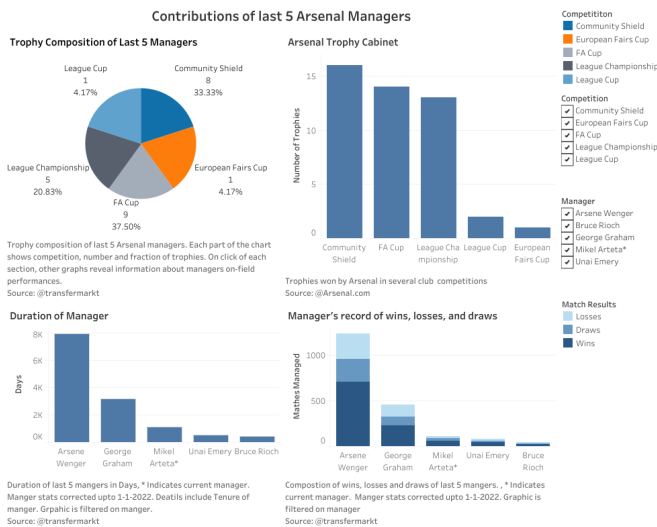


Fig. 2. Trophy cabinet and performance of last 5 managers

1) *Description*: The combination of pie charts and bar graphs in Fig 2 represents the share of trophies won by the previous five managers, manager metrics, and Arsenal's trophy tally to emphasise the manager's service to the club. Manager metrics include manager's tenure in days and composition of win, draws and defeat. The colours on the pie chart's portion represent competition. The accompanying graph reveals the number of titles won by Arsenal and the manager's performance in the particular tournament on click of pie chart section.

2) *Justification*: The visualisation aims to present the proportion of on-field success of the last five managers and managers' details with the categorised result (Wins, Draws and Losses) of match outcomes. The stacked bar effectively depicts match outcomes. The previous five club managers are included to investigate the performance of Gunners before and after the Wenger era.

3) *Narrative Design Pattern*: The graph makes use of a compare [5] and a reveal pattern [5] to efficiently convey the proportion of trophies and on-field performance of the previous five managers.

4) *Strength and Weakness*: Pie charts and bar charts are easy to interpret. However, pie charts do not present all of the data [6]. The bar graphs are supplied with filters on competition and manager to overcome the shortcoming.

5) *Improvements*: Using the reveal pattern to find out the last five managers' on-field performance thus, reducing bar graphs.

## C. Bar Charts representing Stadium Relocation impact and Business Model

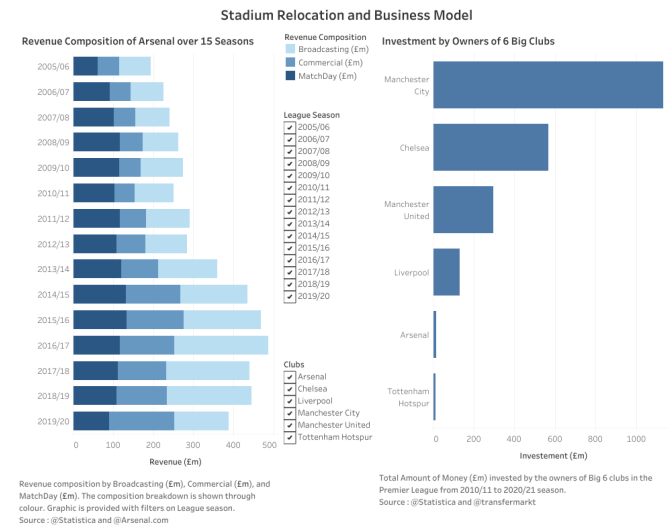


Fig. 3. Impact of stadium relocation and business model

1) *Description*: The two bar graphs in Fig 3 illustrate stadium relocation's impact on the club's finances and operating business model. Arsenal's Directors decided to relocate the club from Highbury to Emirates to compete among the premier clubs in Europe. Emirates has a higher seating capacity and hospitality facilities to produce more revenue. A £260 million commercial loan with a 14-year tenure was arranged to finance stadium development. The loan repayment was contingent on the club's on-field and financial success. During the stadium development era from 2002 to 2006 and the payback period from 2002 to 2016, Wenger's on-field performance enabled a top-four league finish against clubs funded heavily by owner investment. Arsenal's matchday income grew by £30 million after moving to Emirates Stadium in 2006, allowing Gunners to repay debt and compete with elite clubs. The club functioned on a self-sustaining model, as the second bar graph reveals about the investment from the owner.

2) *Justification*: The visualisation's purpose is to reveal the mix of Arsenal's income and the owner's financial contribution to progression. Stacked bar charts efficiently illustrate the revenue composition over three categories. The bar chart is adopted to depict the owner's investment, as the investment is a continuous variable and clubs are categorical variables [6]. As stadium relocation is an important event in the club's history for increasing income, its influence is examined over

15 years to illustrate the consequence of relocation. The club's operating model is evaluated to provide insight of the owner's financing.

3) *Narrative Design Pattern*: Visualisation 3 utilises an exploration and comparison [5] to depict the impact of relocation and business model.

4) *Strength and Weakness*: For 15 seasons, revenue comparison is efficiently illustrated using stacked bar graphs. A multi-bar plot complicates and hinders the graph's interpretation. The graphic is equipped with season and club filters, allowing users to compare revenue from different seasons and investments from club owners.

5) *Improvements*: Enhance presentation by spreading club owners' investment across 15 seasons and providing a solid contrast in stacked bar chart amenities.

#### D. Scatter Plot of Big 6 Clubs Signings with Transfer and Transfer Resale Rating

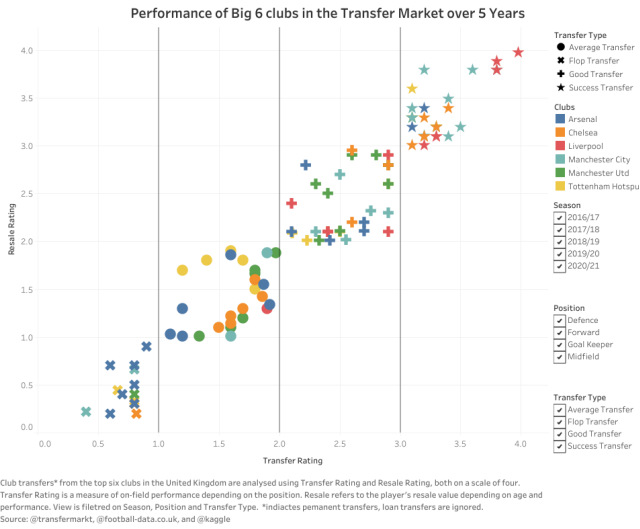


Fig. 4. Performance of 6 significant clubs in the transfer market over last 5 years

1) *Description*: Fig 4 depicts the categorisation of player signings at six significant clubs to relate the performance of the manager, technical director and scouting team in the transfer market. Transfers are classed as flops, averages, good transfers, and success transfers based on a four-point scale of transfer and resale ratings. Click on data points (transfer) reveals recruiting manager, season, player name, age, parent club, and position. A transfer and resale rating of 3 or more is considered a successful transfer, whereas a rating of 1 is called a flop transfer. As successful football teams are built over multiple seasons, player signings for the previous five seasons are analysed. The plot illustrates that Arsenal made the most transfers in the last five seasons, with eight flop moves, the most among the big clubs, and two successful transfers, the fewest among the teams in comparison. Manchester City and Liverpool, on the other hand, have had the most successful transfers, which reflects their standing on the table and the effectiveness of the football operations team.

2) *Justification*: The scatter plot provides insight into Arsenal's transfer strategies by clustering the player acquisition from five major teams over the past five seasons. Quadrant plots show the association between transfer and resale rating, making it easier to analyse the player investment to return ratio [6].

3) *Narrative Design Pattern*: Visualisation 4 employs a comparison [5] and users find themselves [5] pattern to communicate the clubs' performance in the transfer market effectively.

4) *Strength and Weakness*: Scatter plots are used to categorise transfer performance by exhibiting the relationship between transfer and resale rating, demonstrating transfer efficacy. The categorisation helps in understanding the sort of transfer executed by the club. As scatter plots contain many data points (player transfers), filters supplement graphs to reduce reader misinterpretation.

5) *Improvements*: Improved visualisation representing transfer's relation between player and club using bubble of network, with size of the bubble reflecting transfer type.

#### E. Bar Chats reflecting Transfers and Contract Negotiations of Big 6 clubs

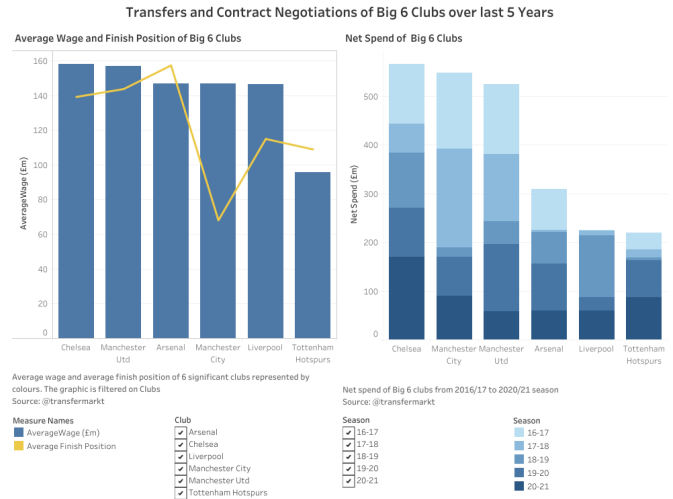


Fig. 5. Performance of 6 significant clubs in contract and transfer negotiations over last 5 years

1) *Description*: In Fig 5 the first chart is a mix of bars and lines depicting clubs pay per performance. The second figure is a stacked bar graph illustrating the club's net spend over the past five seasons, with each bar comprising five seasons showing the overall net spend on player acquisitions. The season is represented with a distinct colour on each bar. Hovering over the clubs reveals net spend, club, and season. Inferring from graphic, Arsenal pays more to non-performing players, as evidenced by higher average finish places and wages than other teams in comparison. The graphs are connected to facilitate straightforward comparisons. Selecting the club of interest reveals the club's net spend.

2) *Justification*: Stacked bar charts depict multiple category variables (seasons), representing breakdown for each season. Bar graph and line graph work well together to present

numerical data (average wage) and compare another continuous variable (Average finish position) to display pay per performance for each club [6]. TV broadcasters pay football teams, which is doubled every five years as more people watch. The club's funds grew due to sponsorship, TV money, and matchday earnings; hence, data from the previous five years is analysed to show the efficacy of Arsenal's negotiating technique compared to the other five teams.

3) *Narrative Design Pattern*: Visualisation 5 adopts a compare [5] and users find themselves [5] pattern to effectively display the net spend and average salary bill of six major clubs.

4) *Strength and Weakness*: The bar's stacks effectively represent the breakdown of net spend/season. Multiple bars in the chart distort and complicate the user experience. The infographics are provided with colour legend and club-specific filters to make it easier for users to examine many teams' net spend and wages without perplexity.

5) *Improvements*: Visualisation can be improved by offering salary breakdowns by season using stacked bar charts to allow for a more in-depth comparison.

#### F. Lines representing relation between Football Operations and Performance

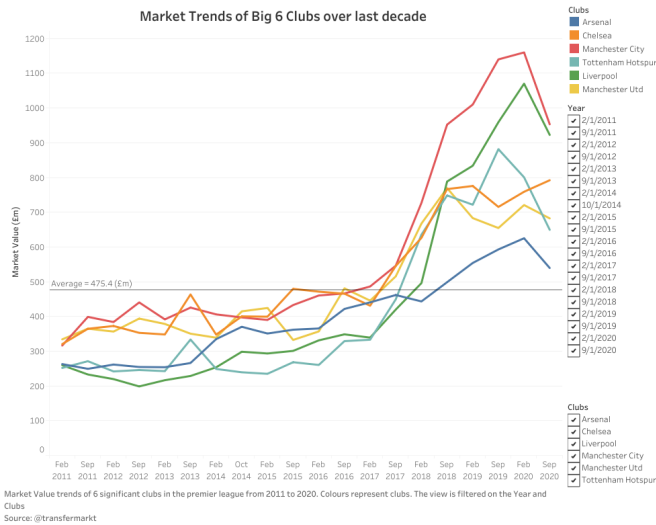


Fig. 6. Market trends of significant 6 clubs over last 10 years

1) *Description*: Fig 6 depicts the relationship between football operations and performance using market value as a metric for over a decade. The colours of the lines represent clubs. The chart illustrates that the market value of all teams has increased over the previous decade, albeit Arsenal's market rise has not been proportionate to the other five major clubs. All teams had a negative trend in 2019 and 2020 due to COVID-19. Football games were held behind closed doors with no fan representation, resulting in a loss of matchday revenue.

2) *Justification*: Line graphs are standard and effective. They are simple, easy to understand, and efficient in comparing

lots of data to depict continuous variable (market value) trends over a timescale (10 years).

3) *Narrative Design Pattern*: Visualisation 5 adopts a compare [5] and users find themselves [5] pattern to convey the market value trends over a decade effectively.

4) *Strength and Weakness*: Lines efficiently represent the market value patterns. A line graph with multiple lines is complicated for users to grasp. The graphics feature highlighters and filters on clubs to help users compare trends.

5) *Improvements*: Visualisation can be improved by including data related to on-field performance aspects.

#### IV. CONCLUSION

Arsenal's on-field performance has steadily deteriorated over the last five seasons. Since Arsene's departure, Gunners have been awaiting a berth in the Champions League from 2016, the club's most notable manager for on-field accomplishments with trophies and contributions to the club's financial stability. The move from Highbury to Emirates has increased Arsenal's earnings, allowing the club to run independently without the owner's investment. Arsenal's football operations have been unproductive in player recruitment and financial negotiations. The club hired non-performing players at higher wages, resulting in pay-per-performance disparity compared to the league's top teams. Arsenal's market worth has not increased due to mismanagement by football operations. Arsenal should study Liverpool's operating model to effectively engage in transfer and contract negotiations to recruit the right player at the best price and pay. Clubs function best when multiple football operations departments collaborate, which is now lacking at Arsenal. Arsenal requires new faces in the operations staff and financial backing from the owners to buy the appropriate players to reclaim former grandeur.

#### REFERENCES

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