

2018 IIA INDONESIA NATIONAL CONFERENCE

Nurturing Agile Internal Auditors in Disruptive Times

*Soccer Analytics: Lessons Learned for
Business Users and Internal Auditors*

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“War is 90% information”
Napoleon Bonaparte

Agenda

1 The beauty of soccer in numbers

2 Data driven wisdoms

3 Lessons Learned

2018 NATIONAL
CONFERENCE
Indonesia Bali, 28-29 August





1

The beauty of soccer in numbers

Soccer Analytics: when it begins?

Analytics:

the discovery, interpretation, and communication of meaningful patterns in data*

First match analysed (on March 1950):



Soccer analytics pioneer:
UK RAF Wing Commander
Charles Reep



versus



Each pass was classified and recorded: direction, height, outcome, originated, ended.

Continued recorded games including 1958 World Cup.

Published scientific paper: Skill and Chance in Association Football (1968), written together with Bernard Benjamin, Chief Statistician at the General Registration Office.

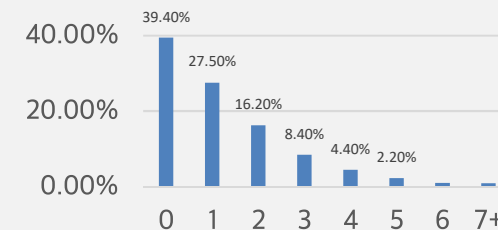
Based on the analysis of games (1953 – 1967), it showed the first time:

“several aspects of the game did follow strong and stable numerical patterns”

“on average teams scored with roughly one of every nine shots “

“only 8.5% passing movements contained > 3 passes

Number of passes frequency

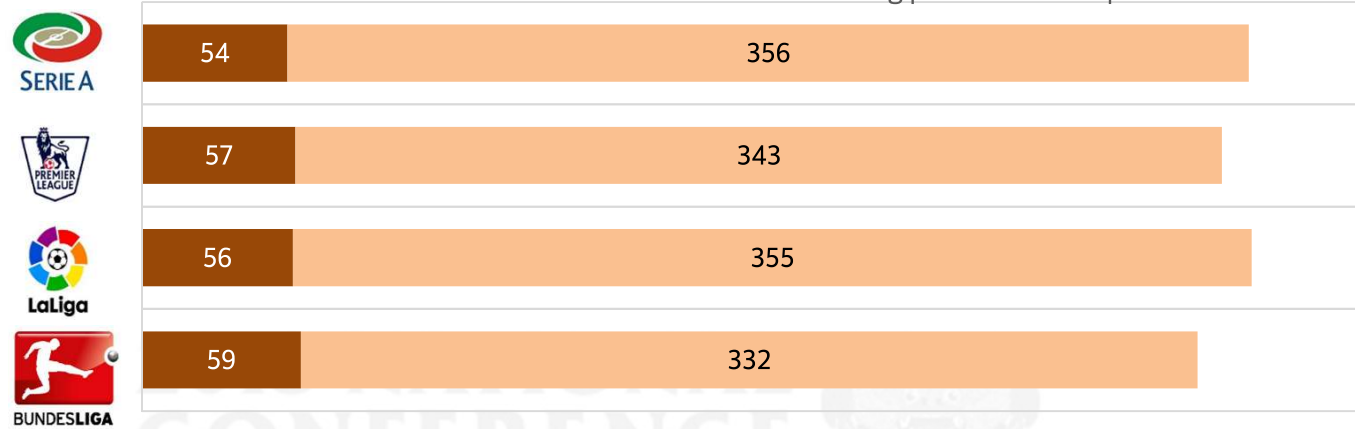


*wikipedia

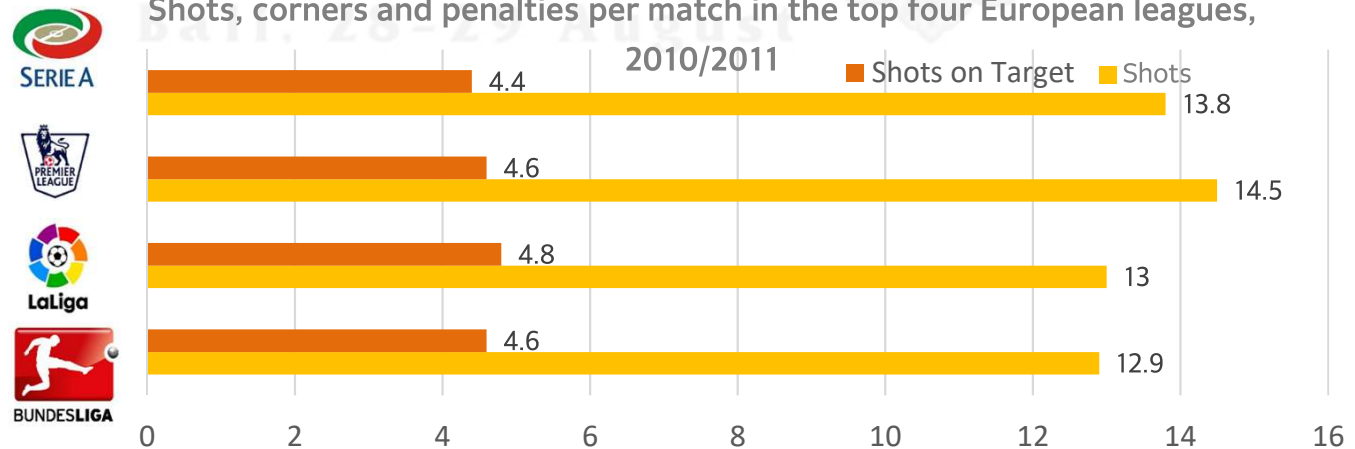
Passes, shots, corners and penalties

The game is the same across top four European leagues, and probably across the world

Average passes per game in the top four European leagues, 2010/2011



Shots, corners and penalties per match in the top four European leagues, 2010/2011



Do number of passes and accuracy matter?

Team that passes more usually complete a greater proportion of them. Teams that complete passes at higher rate get the chance to pass more often.



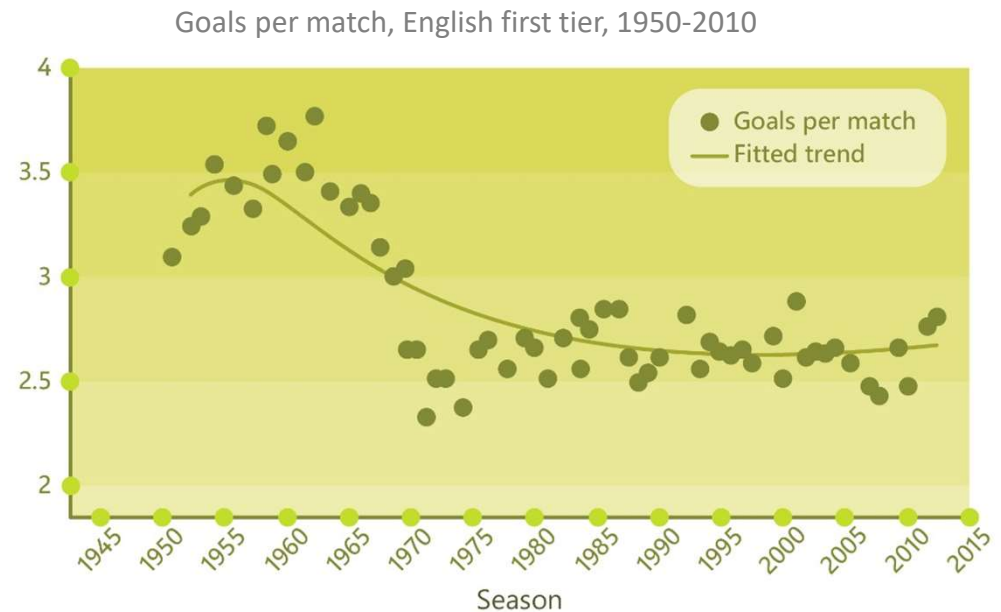
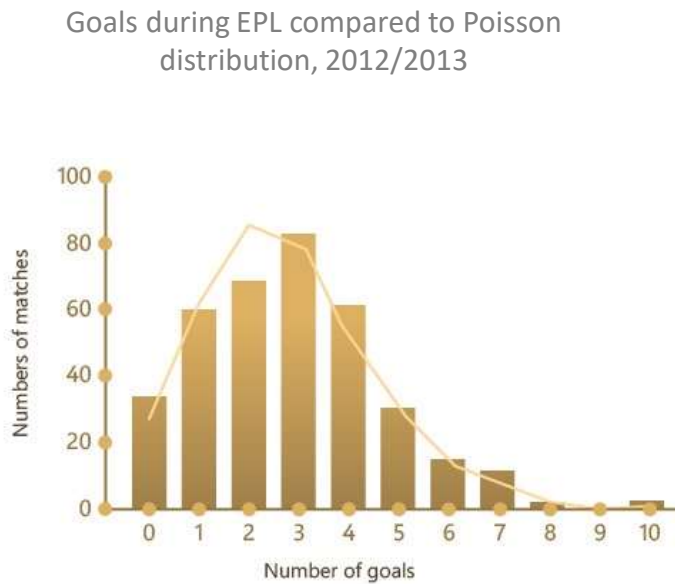
Average number of passes and accuracy EPL, 2010/2011 (by team)

Final results (2010/2011)

- 1 Manchester United
- 2 Chelsea
- 3 Manchester City
- 4 Arsenal
- 5 Tottenham Hotspur
- 13 Stoke City
- 15 Blackburn Rovers
- 18 Birmingham City
- 19 Blackpool
- 20 West Ham United

How many goals per match?

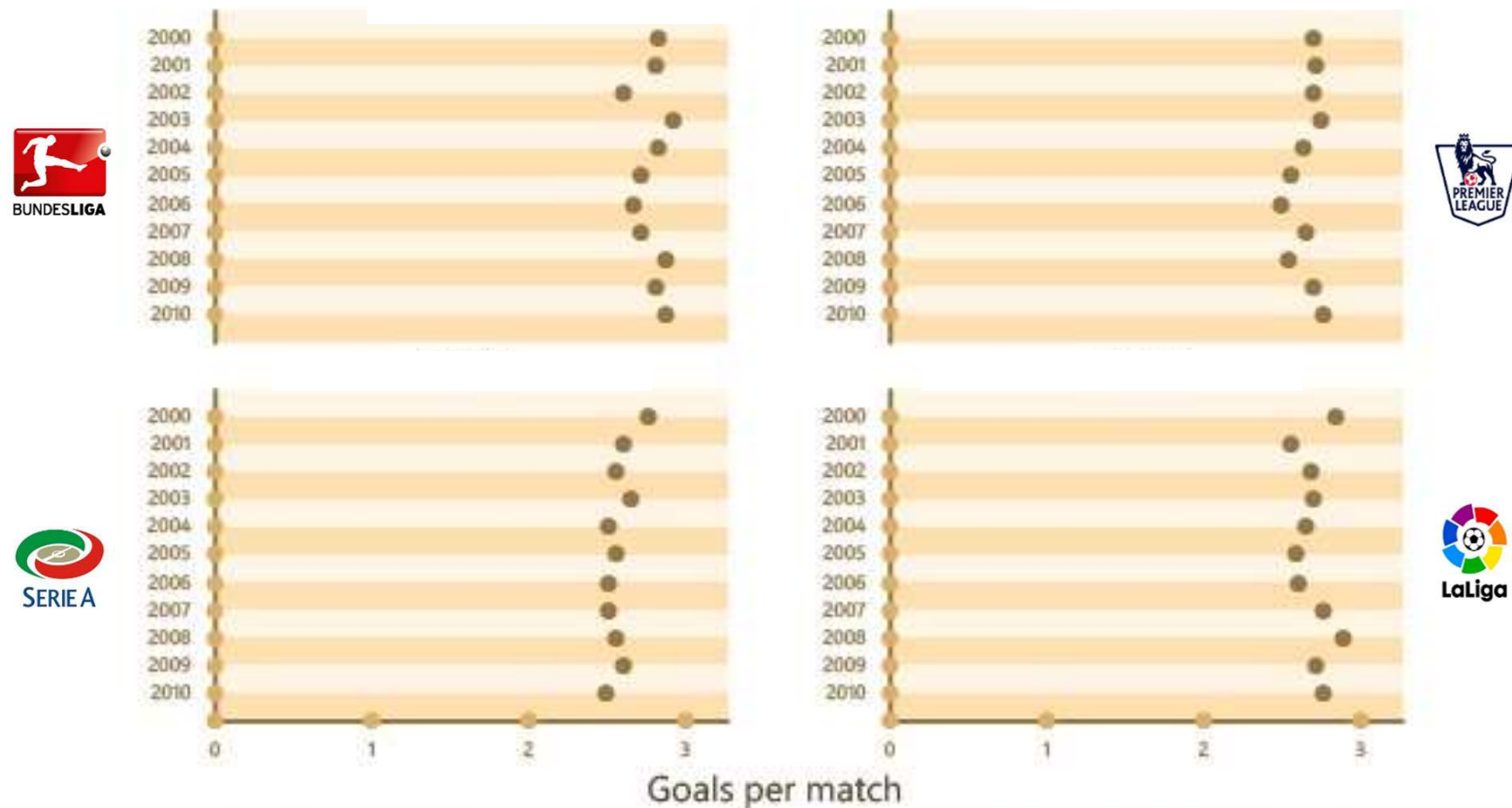
Number of goals per match in EPL has remained stable in the last two decades (around 2.8 goals per match).



*Poisson distribution: discrete probability distribution, is a probability distribution that express the probability of a given number of events occurring in a fixed interval time or space if these events occur with a known constant rate and independently of the time since the last event (Wikipedia)

How many goals per match?

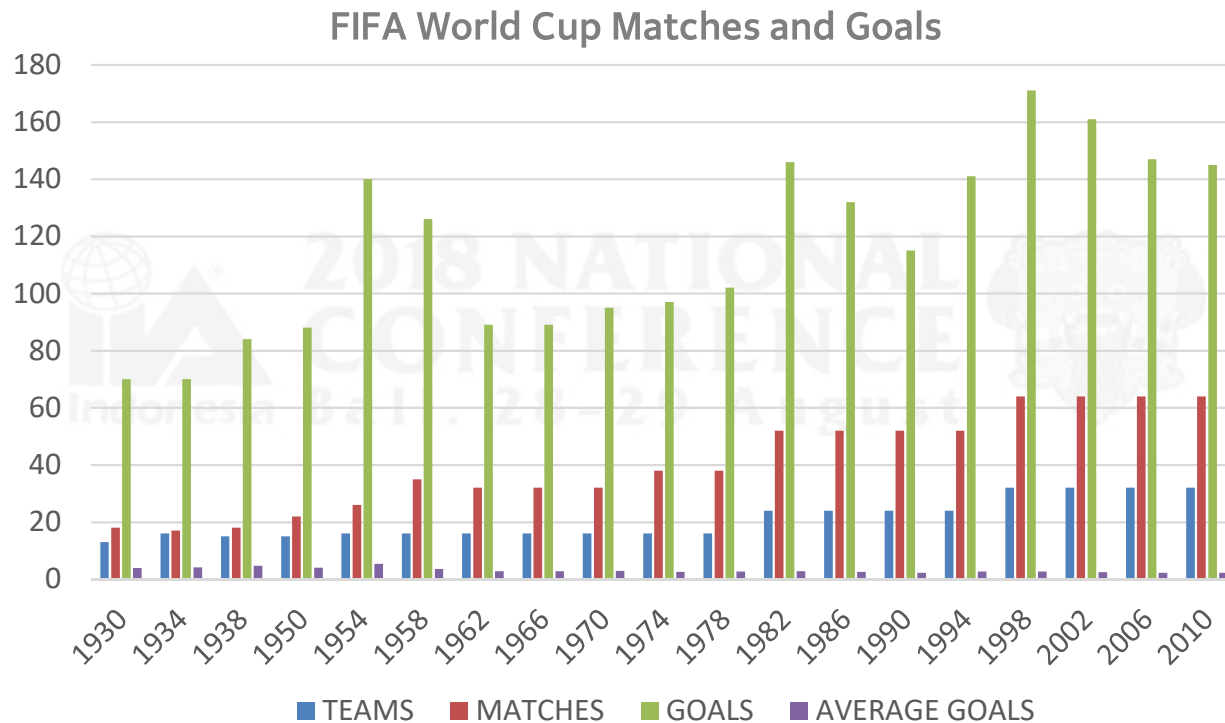
Number of goals per match is very similar in top four European leagues (around 2.8 goals per match).



Goals per match in Europe's top four leagues, 2000/01-2010/11

How many goals per match?

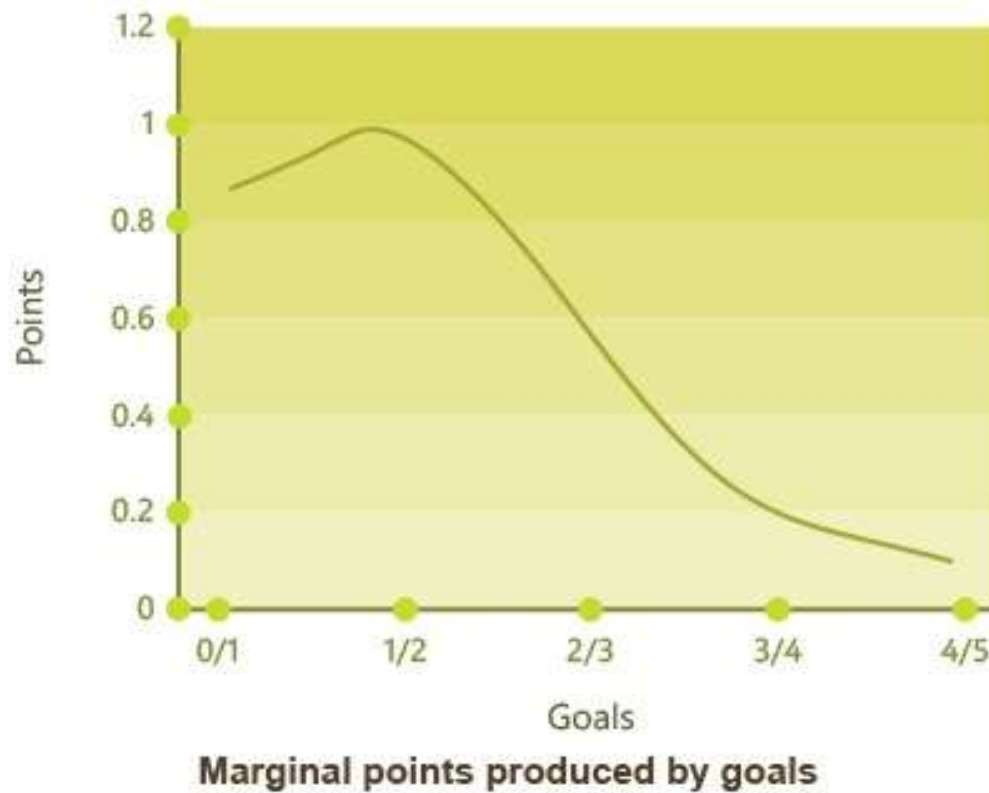
Even in FIFA world cup, number of goals per match is at the same level average (2.86 goals in 772 matches)



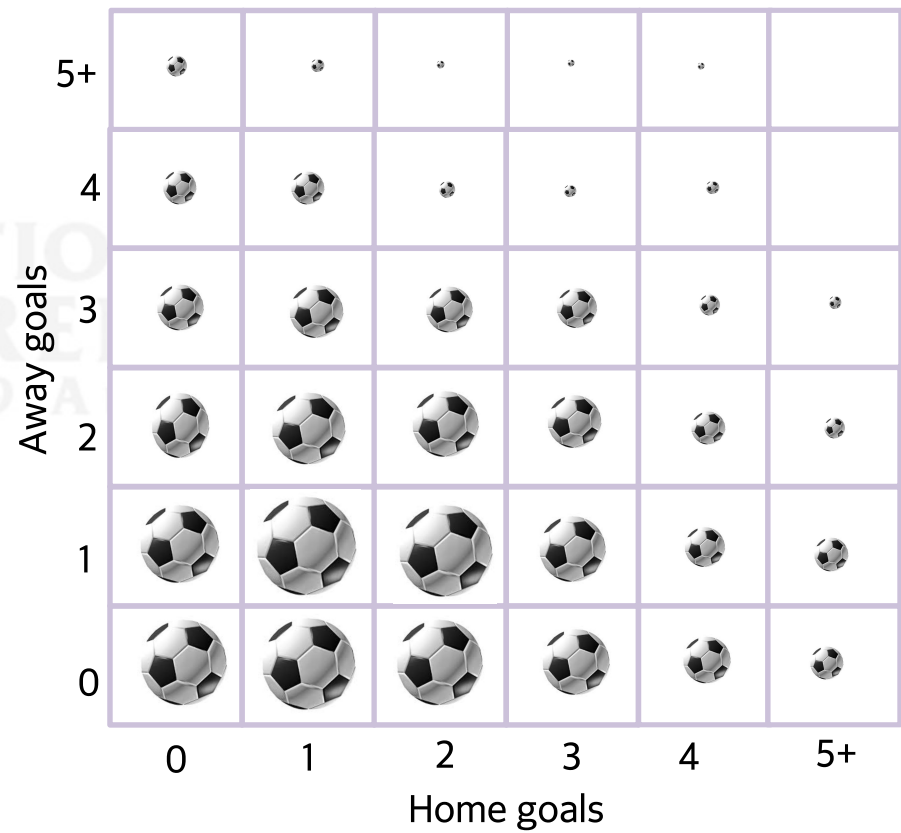
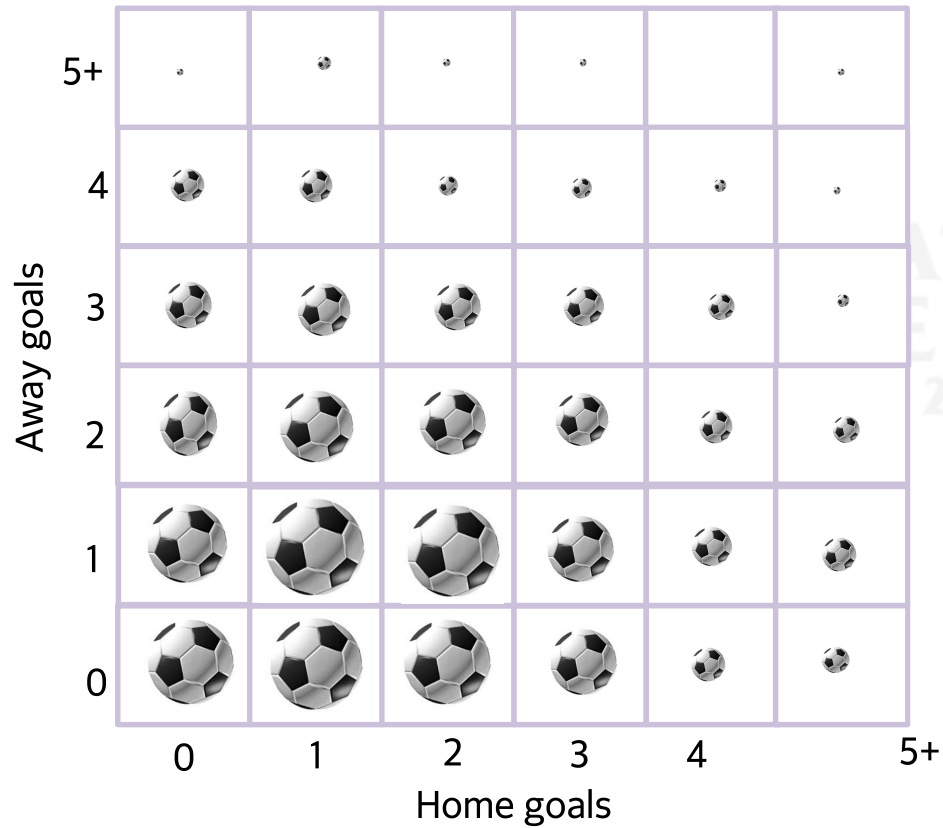
<https://www.sportskeeda.com/football/total-goals-scored-fifa-world-cups-1930-to-2010>

Value of Goals

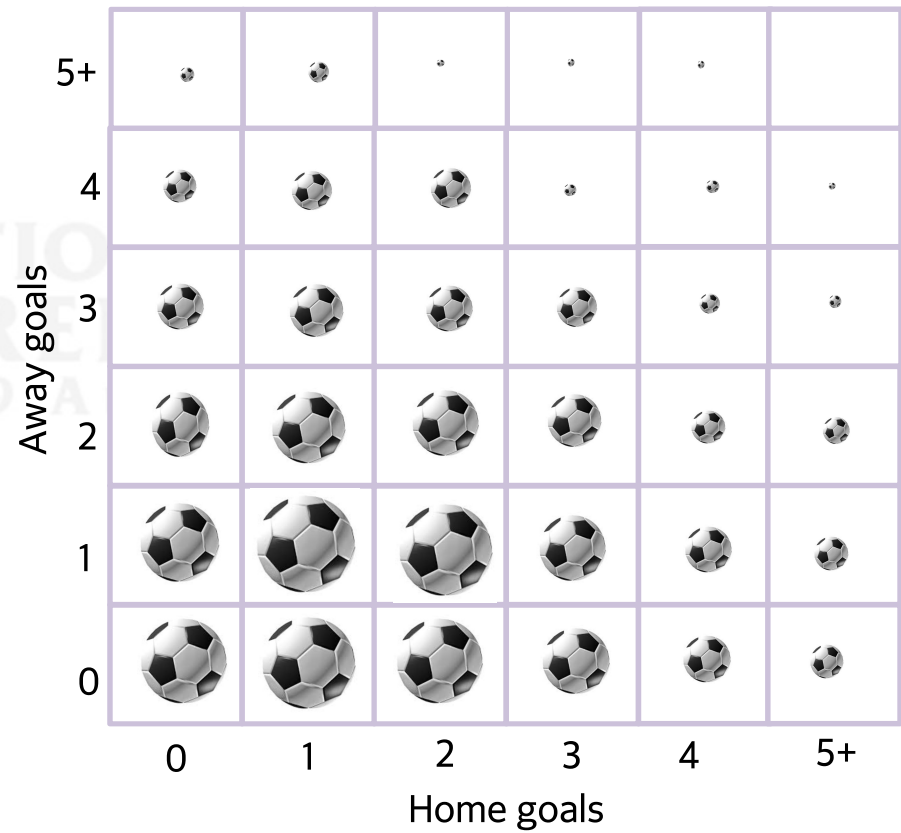
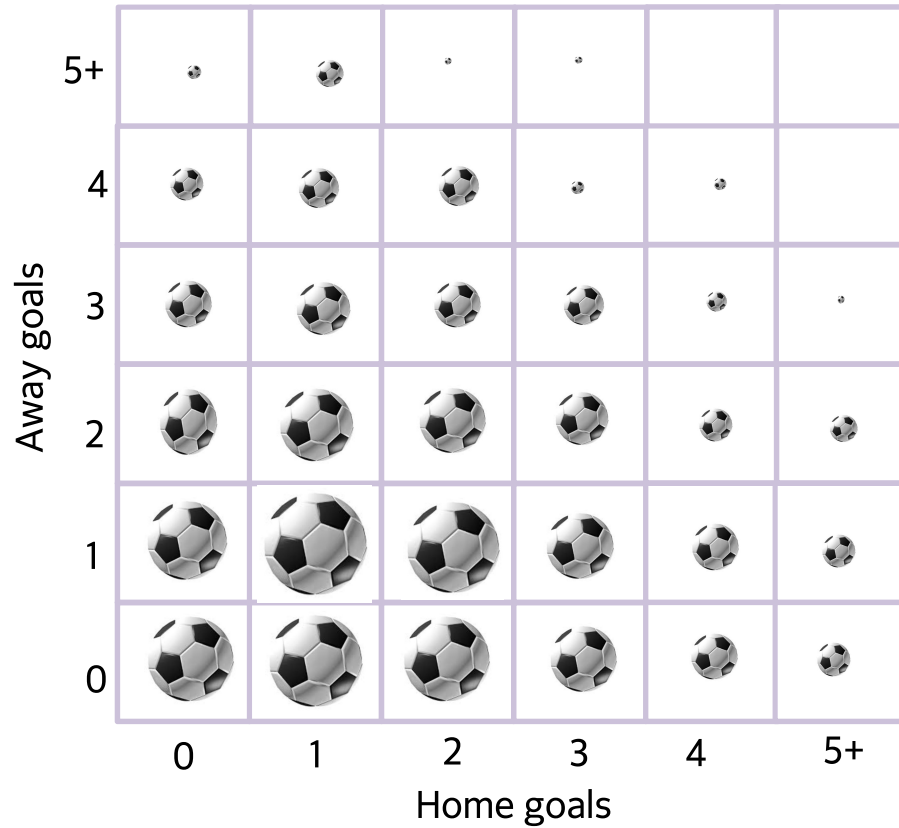
The second goal on average produces biggest addition to points. It is the most valuable goal that wins the game. This applies across countries.



Final score per match



Final score per match



Extreme number of goals

Even in FIFA world cup, 8+ goals are very rare



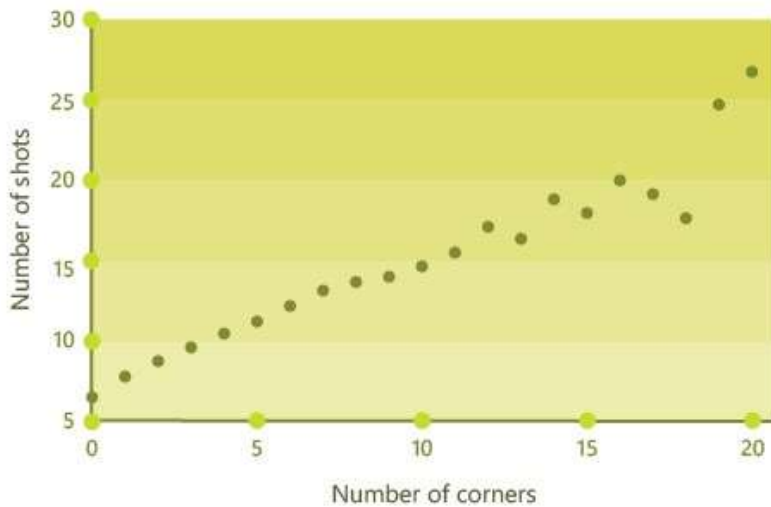


2 Data driven wisdom

Match tactics – Corner kicks

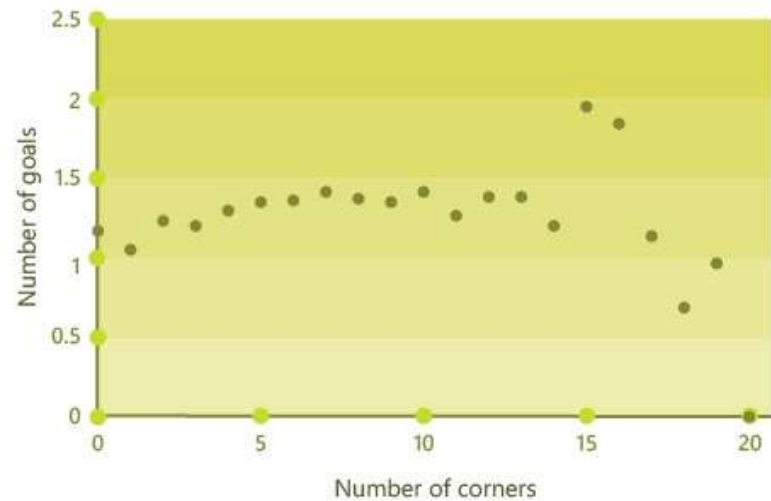
Don't push your defenders to move forward for corner kicks

Corners and shots on goal go hand-in-hand. A team that shoots more will have more corners.



The connection between corners and shots, EPL, 2001/2002 – 2010/2011

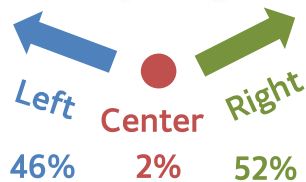
Teams that shoot more and get more corners do not score more goals! Corners have no significant impact on how many goals a team scores.



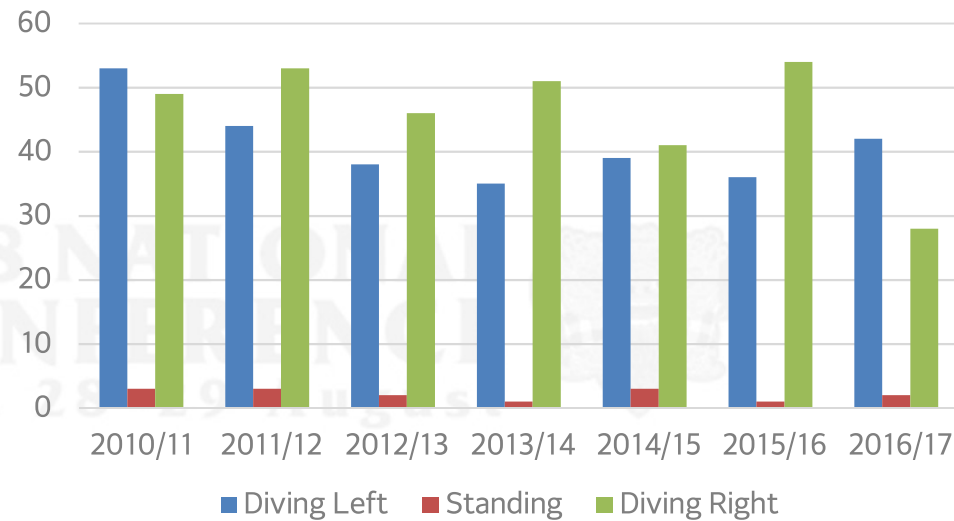
The connection between corners and goals, EPL, 2001/2002 – 2010/2011

Match tactics - Penalty kicks

Of the 72 penalties taken in 2016/17 goalkeepers have not dived either way **only twice**



Where Goalkeepers Move at Penalties?

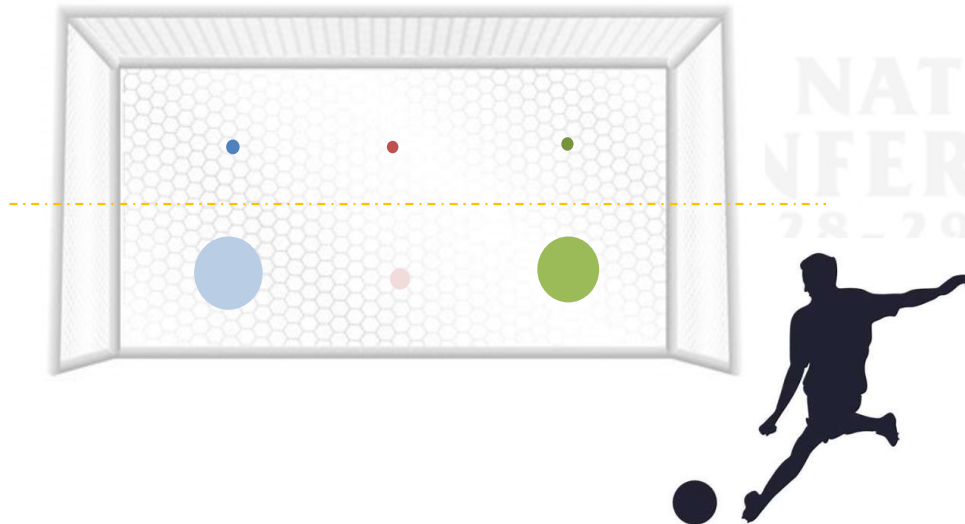


<https://www.premierleague.com/news/317996>

*after 22 matches

Match tactics - Penalty kicks

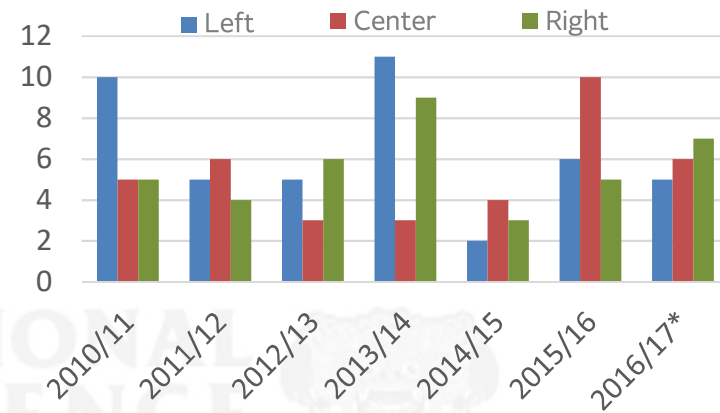
“When I was confident I would back myself to hit in the corner but when the pressure’s on and when you’re not feeling that perfect sometimes, it’s just easier just to concentrate on your technique and hit it down the middle as hard as you can” (Michael Owen – he former Liverpool, Newcastle United and Manchester United forward)



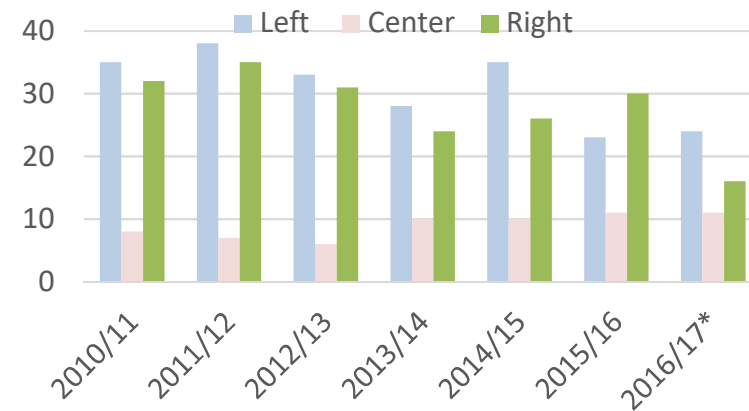
<https://www.premierleague.com/news/317996>

*after 22 matches

Penalty distribution in the Premier League - High Goal



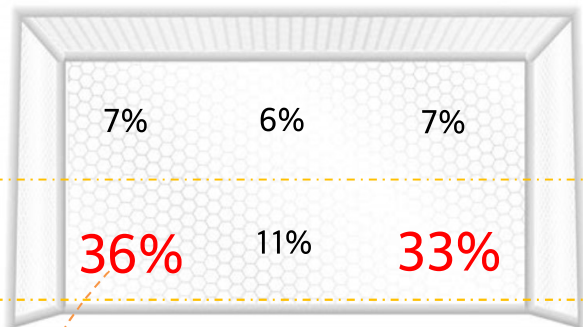
Penalty distribution in the Premier League - Low Goal



Match tactics - Penalty kicks

Data shows goalkeepers resist standing still, shooters do not exploit it for higher penalty success rate!

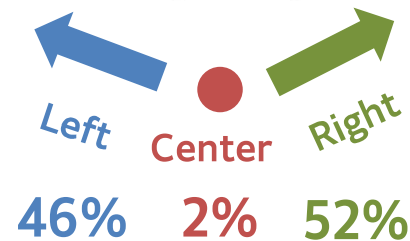
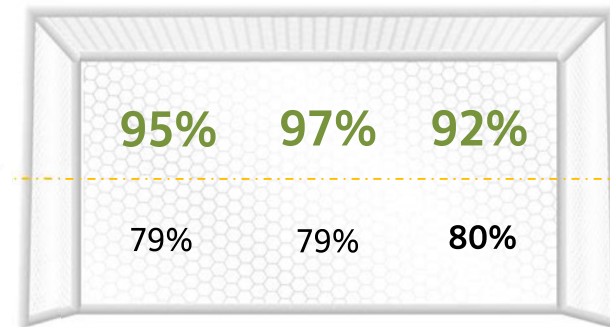
Direction chosen by shooters



Direction chosen by goalkeepers



Penalty conversion rate



www.freepngimages.com

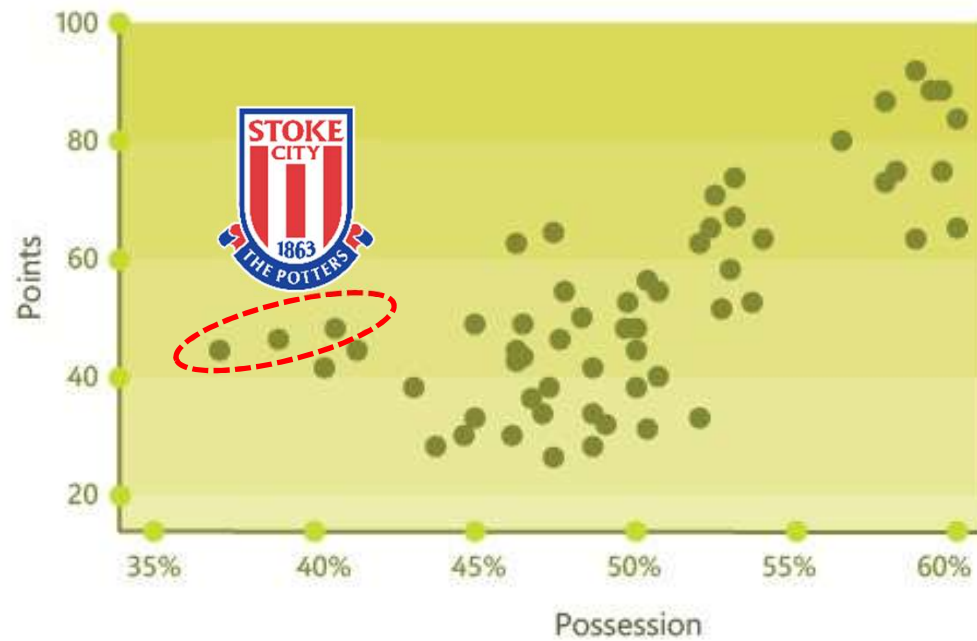
Match tactics - Possessions

Club with more possessions will not win every much – but they will win more lose less.

The average leagues positions (rankings) of clubs with more possessions was 6.7

The average leagues positions (rankings) of clubs with less possessions was 13.8

Stoke City – statistically anomaly, the club has mastered the art of not having the ball



League Points and average possession
Premier League, 2008/09-2010/11

Match tactics – long and short passes

Long-ball clubs have fewer chances to score and therefore score fewer goals.

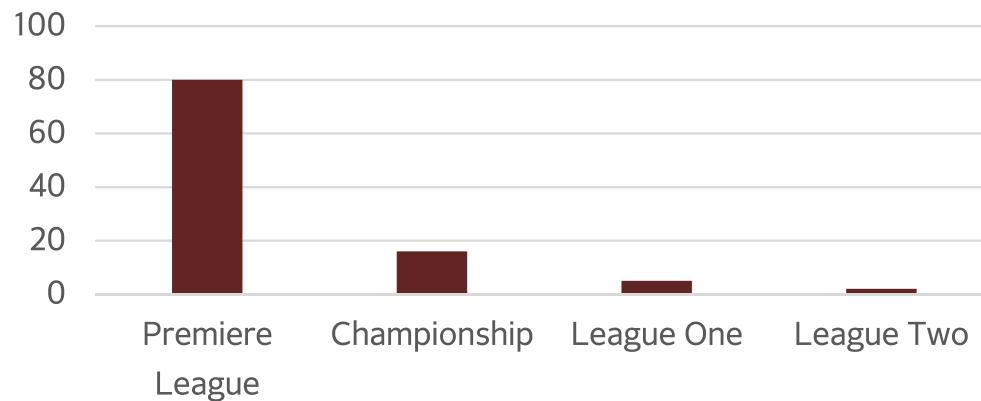


Long-ball ratio and league rank, EPL, 2010/2011

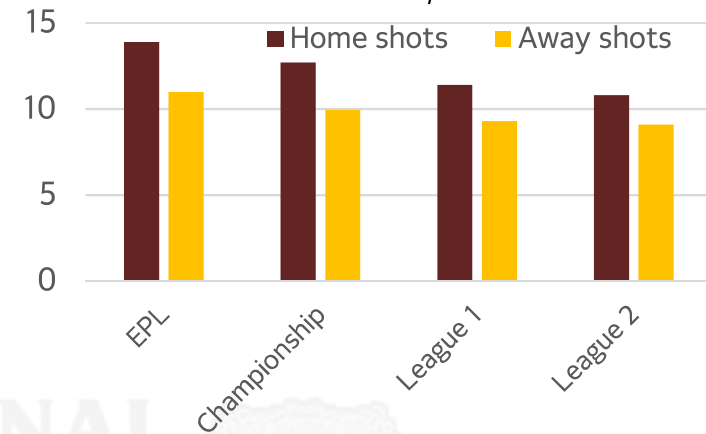
Valuing players

Wages and productivity are much greater as players move through the leagues toward top tier.

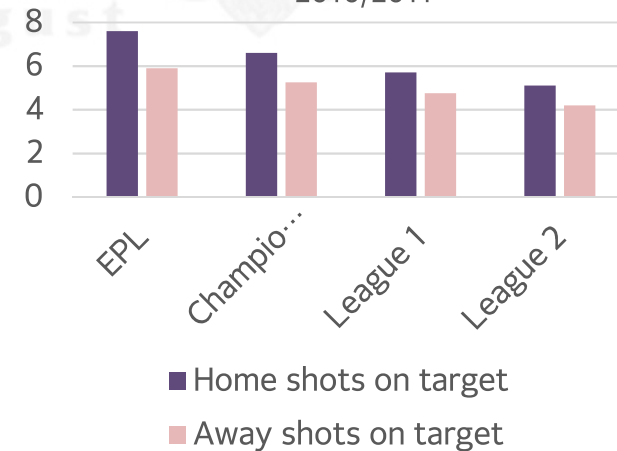
Annual wages in English football, 2010/2011 (GBPm)



Average number of shots per team and match, 2010/2011



Average number of shots on target per team and match, 2010/2011



Valuing players

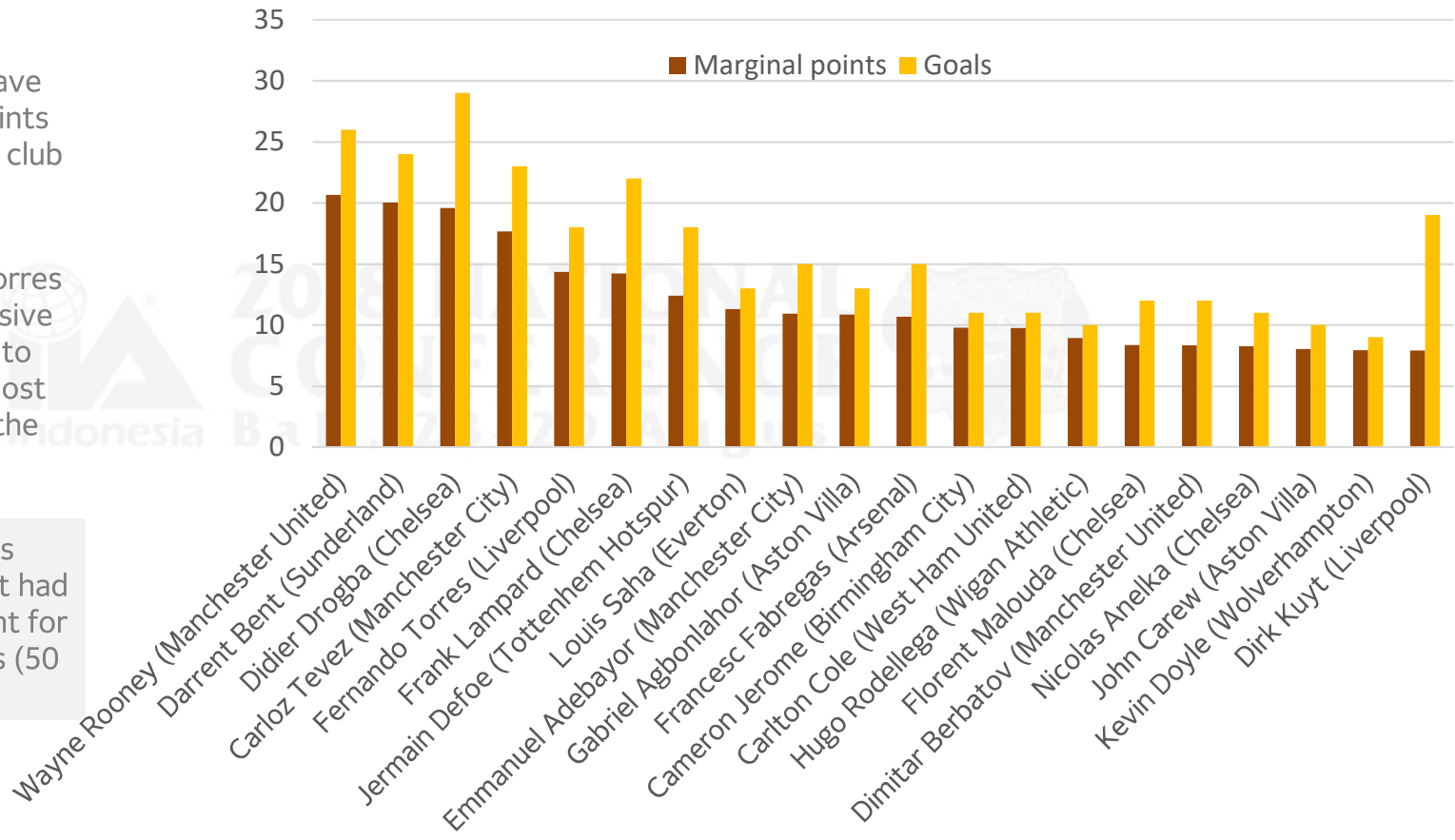
When valuing players, looking at the historical goals they created is an illusion.

Valuable players have higher marginal points (their goals helped club win).

EPL 2009-2010, Torres as the most expensive player transferred to EPL, but not the most valuable scorer in the league.

In Chelsea used this approach, they just had to buy Darrent Bent for half price of Torres (50 million pounds).

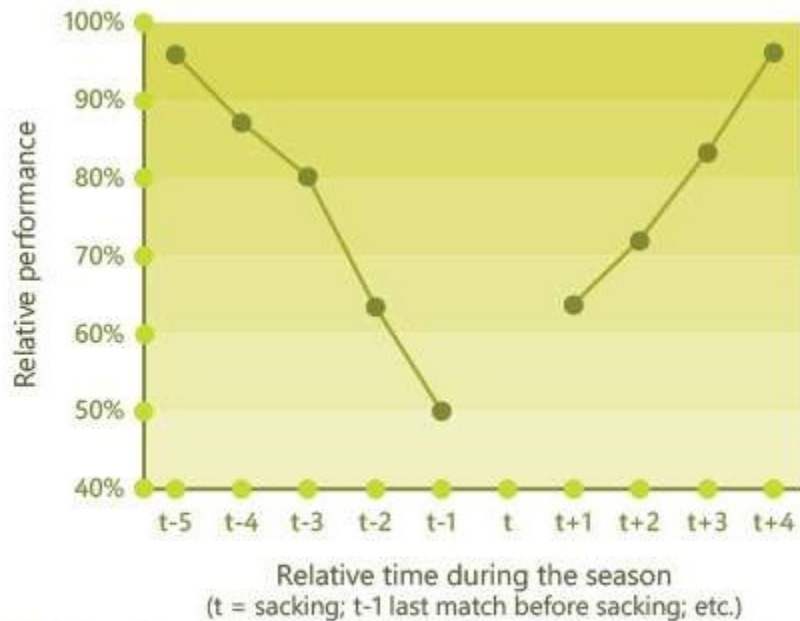
20 marginal point contributors in EPL. 2009/2010



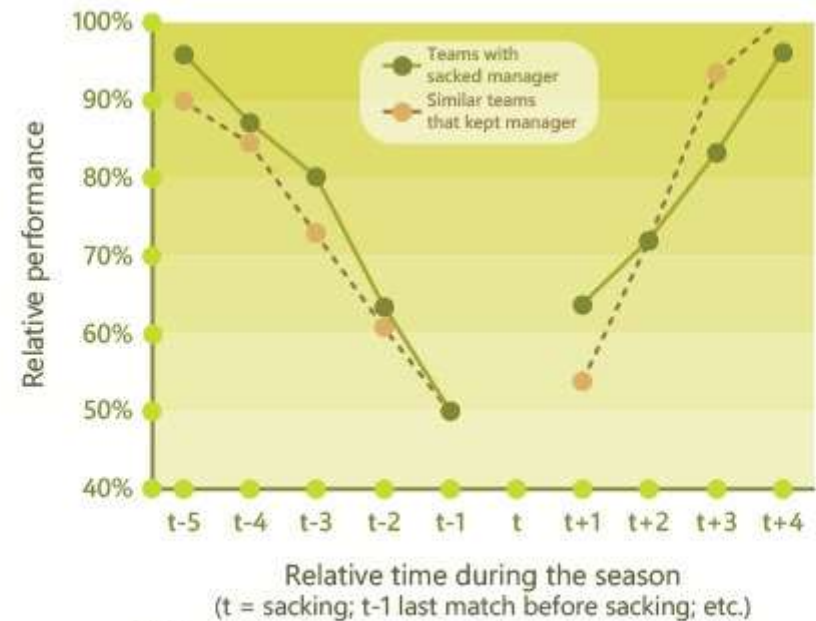
Firing or retaining managers

Think twice before sacking managers

Sacking the manager is usually pointless. Typically, the manager is sacked when the team hits its lowest point. Statistician can predict what will happen after you hit your lowest point: performance will improve, because of the statistical phenomenon known as regression to the mean. Autocorrect mechanism will recover performance



Club performance before and after managerial sacking Eredivisie, 1986-2004



Club performance dips and recoveries with and without managerial sacking, Eredivisie, 1986-2004



3 Lessons Learned

Lessons learned – key takeaways (1/3)

Analytics has been a source of competitive advantage of soccer clubs for years and made possibly through.....

1 Clear use cases

- Articulating what to achieve from analytics by asking the right questions
- Having hypothetical ideas on how we can use the discovered wisdom and hidden messages from data through right matrices

In August 2001 Manchester United's manager Alex Ferguson suddenly sold his defender Jaap Stam to Lazio Roma. The move surprised everyone. ...studying the numbers, Ferguson had spotted that Stam was **tackling less often than before. He presumed the defender, then 29, was declining.** So he sold him.

Lessons learned – key takeaways (1/3)

Analytics has been a source of competitive advantage of soccer clubs for years and made possibly through.....

1 Clear use cases (continued)



The screenshot shows a web browser window with the URL <https://thesefootballtimes.co/2018/02/22/the-story-of-jaap-stam-and-sir-alex-fergusons-greatest-mistake/>. The page header includes 'THESE FOOTBALL TIMES' and navigation links for 'MAGAZINE', 'FEATURES', 'ORIGINAL SERIES', 'PODCASTS', 'ABOUT', and 'SHOP'. The article title is 'THE STORY OF JAAP STAM AND SIR ALEX FERGUSON'S GREATEST MISTAKE' by DANKEN MCEVOY, dated 02/22/2018. A photo of Jaap Stam in a red and white football kit is visible.

Paolo Maldini (AC Milan, Italy) rarely made a tackle. Maldini never had to get his legs dirty because he was always in the right place to cut off the danger.

“Maldini made one tackle every two games”, Mike Forde (former Chelsea’s Director of Football Operations)



As Ferguson later admitted, this was a mistake. Like many football men in the early days of match data, the manager had studied the wrong numbers. Stam wasn't in decline at all: he would go on to have several excellent years in Italy. Still, the sale was a milestone in football history: a transfer driven largely by stats

Lessons learned – key takeaways (1/3)

Analytics has been a source of competitive advantage of soccer clubs for years and made possibly through.....

2 Appreciation on data as assets

- Exploring various data sources and types
- Organizing and storing data for current and future use

“We’ve somewhere around 32 million data points over 12,000, 13,000 games now,” Mike Forde

“Now, data is another tool to help us to improve the players and the team”(former Benfica and Portugal striker Nuno Gomes, GM at Caixa Futebol Campus, Sport Lisboa e Benfica)

3 Proper data team

- Hiring and nurturing data scientists who support performance and match analysts, talent scouts and management

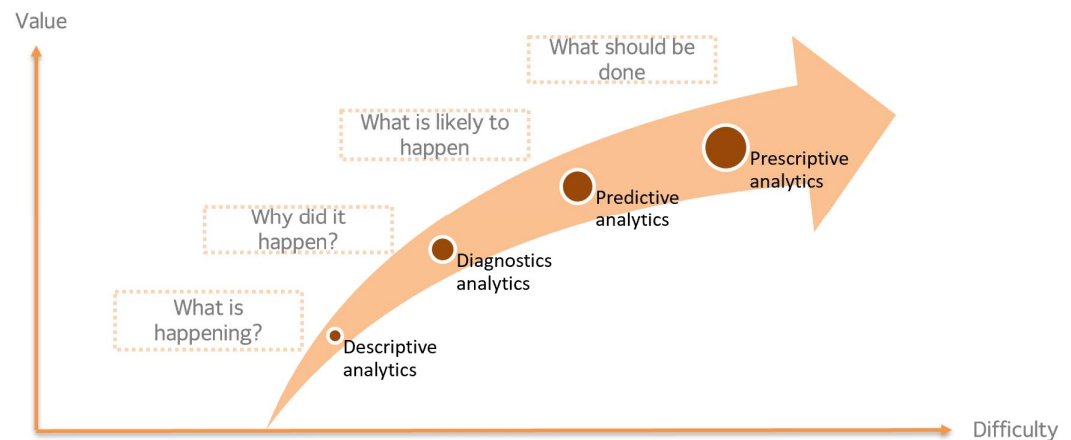
Lessons learned – key takeaways (2/3)

Analytics has been a source of competitive advantage of soccer clubs for years and made possibly through.....

4 Data science approach

- Using data science discipline to discover pattern, answer questions, and formulate tactics and actions

“Using machine learning and predictive analytics we can learn the facts that lead to success”
(Bruno Mendes, Head of Operations – Benfica LAB)



Source: Gartner Group

Lessons learned – key takeaways (2/3)

Analytics has been a source of competitive advantage of soccer clubs for years and made possibly through.....

5 Technology

- Using technology to acquire and record data (investing in or sourcing)
- Utilising proper analytical tool (statistical / mathematical modelling, visualisation)

Benfica operated their own data center and servers to do the computation the past but now is using cloud provider

Lessons learned – key takeaways (3/3)

Analytics has been a source of competitive advantage of soccer clubs for years and made possibly through.....

6 Ongoing test and learn

- Defining use and business cases
- Implementing the outcome of analysis and modelling over time and making adjustment for optimum results

“A team that commits errors in no more than 15 to 18 per cent of its actions is unbeatable,” (Professor Anatoly Zelentsov, adviser to the former Dynamo Kiev’s manager Valeri Lobanovski)

Football teams have always sold and traded players, but Benfica has turned it into an art form: buying young talent; using advanced technology, data science, and training to improve their health and performance; and then selling them for tens of millions of pounds—sometimes as much as 10 or 20 times the original fee. In 2007 David Luiz joined Benfica for €1.5 million; just four years later, Luiz was traded to Chelsea for €25 million and player Nemanja Matic. Then, three years after that, Matic returned to Chelsea for another €25 million. All told, S.L. Benfica raised more than £270 million (€320m) from player transfers over the last six years.

“Soccer is a magical game”

David Beckham



“Learning from others is
the best part of life”

Unknown quote

Reference

Chris Anderson, David Sally (2013), *The Numbers Game: Everything You Know About Football is Wrong*. London: Penguin Books

Damien McEvoy, "The story of Jaap Stam and Sir Alex Ferguson's greatest mistake", 22 February 2018; <https://thesefootballtimes.co/2018/02/22/the-story-of-jaap-stam-and-sir-alex-fergusons-greatest-mistake/>

David Sumpter (2017), *Soccermatics: Mathematical Adventures in the Beautiful Game*. London: Bloomsbury Sigma

Harry Pettit, "How Benfica uses technology and data science to be one of the world's best football clubs", 26 May 2017; <http://www.dailymail.co.uk/sciencetech/article-4544900/How-world-s-best-football-clubs-use-data.html>

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Simon Kuper, "A Football Revolution", *Financial Times*, 17 June 2011; www.ft.com/cms/s/2/9471db52-97bb-11e0-9c37-00144feab49a.html#ixzzitAmHkURd

Shubham Mazumdar, "Total goals scored in all FIFA World Cups from 1930 to 2010", 21 June 2014; <https://www.sportskeeda.com/football/total-goals-scored-fifa-world-cups-1930-to-2010>

Acknowledgement

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Present

- Co-founder, Lead Advisor - Centria Integrity Advisory (TeamMate Wolters Kluwer in Indonesia)
- Member – Risk Management and IT Oversight Committee – BPJS TK
- Independent Commissioner & Audit Committee Chairman – Bina Artha Ventura

Past

- Member – Audit Committee (Oversight) – Petrokimia Gresik
- Member – Risk Management Committee (Oversight) – Petrokimia Gresik
- Senior Adviser – Risk Management – Perusahaan Gas Negara, Tbk
- Member – ICT Evaluation – National ICT Council

Professional Associations (Present)

- Governor & Chairman of Research Committee – IIA Indonesia
- Member – QIA Certification Board
- Board Member – Audit Committee – Indonesian Institute of Audit Committee

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- MSc(Eng) – Engineering Management – The University of Birmingham, UK
- ST / B.Eng – Electrical Engineering – Institut Teknologi Bandung