

School of Sport, Exercise and Health Sciences

Movable Temples: The impacts of new football stadiums on Home Advantage

(Templos Móveis: Os impactos dos novos estádios de futebol no Fator Casa)

Marco Pereira da Silva Sirangelo

Bachelor of Administration by Fundação Getulio Vargas

Supervised by Prof. Paul Downward

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Introdução em português

O presente documento foi apresentado e posteriormente aprovado com avaliação *Merit*, como projeto final do programa de mestrado em gestão esportiva oferecido pela Universidade de Loughborough, no Reino Unido, turma de 2017. Segue abaixo um breve resumo deste estudo, seguido da versão original.

Apresentação do tema

Os estádios representam um componente essencial ao ambiente do futebol. Esses locais não somente recebem as partidas, como também estão frequentemente associados com a identidade e senso de comunidade que são carregados pelos clubes. A partir do aumento da atividade econômica relacionada ao esporte, os estádios, que antigamente priorizavam apenas a execução de jogos de futebol, tornaram-se importantes ferramentas comerciais com amplo impacto na estrutura financeira dos clubes.

Desta maneira, motivados principalmente pela possibilidade de aumento em suas receitas, diversos clubes de futebol ao redor do mundo decidiram por reformar, expandir ou construir novos estádios. Recentemente, apenas na Europa, Real Madrid, Chelsea, Roma e Barcelona anunciaram planos de modificação de seus atuais campos, enquanto outros clubes, como Atlético de Madrid, Tottenham e Juventus, já implantaram esta estratégia.

Essa decisão de mudar de estádio gera um amplo debate entre o que podemos chamar de *stakeholders* dos clubes de futebol, tais como jogadores, torcedores, donos ou acionistas (quando aplicável), autoridades locais, ligas e federações. Apesar de extensa, esta discussão está fundamentada em aspectos que não estão efetivamente relacionados com o jogo de futebol em si. Seguem, principalmente, critérios comerciais e financeiros. Desta forma, a presente dissertação procurou investigar o impacto envolvendo essa estratégia de mudança na principal atividade desempenhada pelos clubes: o jogo de futebol.

Revisão de Literatura

De maneira a avaliar as motivações que levam os clubes a adotarem essa estratégia de modificação de seus estádios, alguns aspectos foram levantados para serem aprofundados. Primeiramente, uma discussão dos motivos pelos quais os clubes mudam seus estádios foi apresentada, seguida pela introdução do conceito de *Home Advantage*, ou *Fator Casa*.

Em geral, existem dois principais fatores que justificam as mudanças nos estádios - a procura de um substancial aumento em suas receitas, ou para estarem adequados com exigências regulatórias, como por exemplo o Taylor Report (1990) ou até mesmo o bastante discutido Padrão Fifa. Nesta primeira categoria, é importante entender quão significativo é o impacto causado pelos estádios na estrutura de receitas dos clubes.

Noll e Zimbalist (2011) demonstraram como diferentes fontes de receitas relacionadas com os estádios evoluíram através dos anos, partindo do faturamento obtido pela venda de bilhetes de jogos, até importantes quantias absorvidas pela venda de camarotes, concessões alimentícias e acordos de patrocínio, como os *naming rights*. O ponto crucial nesta estratégia de construção ou reconstrução de um estádio não está apenas na possibilidade de atrair um número maior de espectadores por partida (muitas vezes um local mais moderno não possui mais cadeiras disponíveis), mas em absorver de maneira efetiva o poder aquisitivo dos fãs por meio de modernas instalações e melhores experiências de compra.

Frequentemente alheio a esta discussão estão os fatores esportivos. A mudança em um estádio muitas vezes modifica todo o senso de familiaridade em se jogar *em casa*, seja por uma alteração de endereço ou de aspecto e formato, seja pela iluminação e tamanho do campo de futebol. De modo a quantificar o impacto de um novo estádio na performance esportiva, o conceito de *Home Advantage*, ou *Fator Casa*, foi introduzido ao debate.

De acordo com Courneya e Carron (1992), o Fator Casa (FC) é o termo utilizado para representar que os times que jogam em casa durante competições esportivas levam vantagem. A definição deste fenômeno é antiga, porém se mantém atualizada e bastante verificada. Jamieson (2010) concluiu que não se trata somente de um fenômeno consistente e robusto, como também verificou que é no futebol que o fator casa tem mais peso e influência no resultado, em comparação com outros esportes.

Como forma de associar os temas apresentados e também medir os impactos que uma modificação no estádio tem sobre o fator casa, dois tópicos foram apresentados à discussão – se o sucesso de um clube está diretamente relacionado com seu FC e como um estádio em particular pode influenciar este fator. Uma vez possível de relacionar estes tópicos, existem evidências sobre a influência de um estádio no FC e, conseqüentemente, no sucesso de um clube de futebol.

Metodologia

Como forma de investigar o impacto desta reestruturação do local de mando de campo sob o ponto de vista esportivo, foram coletados 1.550 resultados de partidas até o fim da temporada 2016/2017 envolvendo oito clubes de futebol que recentemente mudaram seus estádios (Bayern de Munique, Juventus, Nice, Arsenal, West Ham, Palmeiras, Grêmio e Corinthians).

De maneira a quantificar o *fator casa*, foi desenvolvido um modelo que levou em consideração os pontos obtidos em um mesmo número de partidas em casa, porém realizadas em estádios diferentes. Por exemplo, até o período estipulado para análise, o Arsenal havia disputado 209 jogos do campeonato inglês em seu novo Emirates Stadium. Desta forma, os últimos 209 de seu antigo estádio também foram selecionados para comparação.

Além dos pontos conquistados, o comportamento da torcida em cada jogo possui forte relação com o fator casa. Assim, informações de público presente e porcentagem de ocupação do estádio também foram levantadas para a amostra selecionada.

Através dos dados levantados foi possível estipular um modelo de regressão de modo a estimar se a mudança de estádio afeta a performance de um time. A variável dependente é a performance, medida pelo número de pontos obtidos em cada partida, enquanto as variáveis independentes foram local da partida (em formato de variável *dummy*, com valor 1 quando o jogo é no estádio novo e 0 quando foi disputado no estádio antigo), porcentagem de ocupação de torcida e uma variável controle, necessária para controlar possíveis *momentum* (desempenhos superiores à normalidade).

Resultados

A análise estatística, feita através do software IBM SPSS, procurou responder o problema de pesquisa proposto: *Existe um impacto significativo nos resultados como mandante de clubes de futebol que optaram por reformar ou construir novos estádios?* Esta análise quantitativa esteve formulada como uma equação de regressão, conforme demonstrado abaixo:

$$Y_t = \beta_1 + \beta_2 \text{local}_t + \beta_3 \% \text{ocupação}_t + \beta_4 Y_{t-1} + \varepsilon_t$$

A performance do clube é a variável dependente Y , enquanto local, porcentagem de ocupação do estádio e pontos obtidos na partida anterior são as variáveis independentes X_1 to X_4 . β_1 to β_4 são os parâmetros a serem estimados, t são as unidades de análise (neste caso, cada amostra de jogos por clube através das temporadas levantadas) e ε o erro.

A análise dos resultados pode ser realizada através do teste de hipóteses gerado, em que nos casos em que a hipótese nula é rejeitada, há um indicativo de que a performance de um clube é afetada por uma mudança de estádio.

Os resultados da regressão para cada time estão apresentados no capítulo 4 do estudo. Apesar de analisados individualmente, podemos afirmar que os respectivos valores do coeficiente de determinação (R^2) por toda a amostra foram bastante baixos. Isso demonstra que o modelo desenvolvido não é capaz de explicar a variação na performance de maneira satisfatória. Por exemplo, apenas 1,05% da variação da performance do Bayern de Munique pode ser explicada pelo local do jogo, a porcentagem de ocupação do estádio e os pontos obtidos na partida anterior.

Esse resultado está de acordo com o que Richard Pollard descreve como um “quebra-cabeças insolúvel”, uma vez que existem diversas outras variáveis que podem interferir no Fator Casa além das escolhidas. Características como o cansaço de viagens, viés dos árbitros, condição do gramado, táticas implantadas com sucesso e também a interação entre essas causas parecem ter mais influência no resultado de uma partida do que apenas o estádio em que o jogo é realizado.

A análise de regressão para cada clube demonstrou um teste estatístico não significativo, de maneira a rejeitar a hipótese alternativa. Assim, podemos concluir que diferentes estádios não afetam a performance. Contudo, este teste não significativo não deve ser interpretado como se não houvesse relação entre as variáveis. Existe um impacto causado pelo estádio, porém ele não é consistente suficiente de maneira a influenciar os resultados obtidos pelo time mandante.

Uma vez que o Fator Casa é principalmente medido pelas vitórias obtidas pelo time mandante e a análise dos dados produziu resultados que não conseguem associar os impactos de uma mudança de estádio na performance, podemos responder ao problema de pesquisa. Não há evidências que uma remodelação de estádio possa afetar os resultados de um clube de futebol que optou por adotar esta estratégia de remodelação.

A conclusão formulada através dos resultados obtidos indica que renovar ou construir um novo estádio é uma estratégia positiva a ser adotada pelos clubes de futebol, uma vez que, caso bem implantada, pode representar um significativo aumento no faturamento dos clubes sem que isso impacte negativamente seus resultados e sua performance esportiva.

Abstract

The adoption of the strategy to build or renovate a stadium is a subject much discussed in the current football environment. However, the main aspects guiding this decision-making process are more focused on the search for an increase in club's commercial and financial activities than in the game of football itself. In order to explore the effects caused by a change in stadium in a club performance, a total of 1,550 home games were collected from eight teams that have recently changed facility, alongside information regarding attendance and stadium occupation. The method used to quantify Home Advantage was based on the number of points obtained by the teams in matches played at different grounds in different periods of time. In case of a significant impact performed by a different venue and its crowd effects it would be possible to conclude that a new stadium affects Home Advantage. The present findings suggest that other elements impact performance more significantly than only stadia and its percentage of occupation. In addition, there is no evidence that a change in stadium could affect the home results of a football club.

Keywords: *Football, home advantage, stadium, crowd size*

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Chapter One: Introduction

1.1. Introduction

The first chapter of this dissertation will introduce the overall subject of this research. The following subsections will present the importance and the context for this study (subsection 1.2), the proposed research question, aim and objectives that are intended to be discussed (subsection 1.3) and a summary of all further chapters (subsection 1.4).

1.2. Context of Research

Football stadiums have significant relevance among the football environment, as they are often associated with local identity and community sense (Bale, 2000). With the increase of the economic activity related with the sport, stadiums once primarily aimed at the execution of games only, became essential commercial tools with substantial impact on football club's financial structures (Jewell et al., 2014).

Therefore, motivated mainly by the possibility of increasing their revenues (Trumpbour, 2007), several football clubs from around the world have more recently decided to reform, expand or move from their previous stadiums. Some practical examples of teams that are planning to change or to renovate their stadiums are present in recent news (such as Atletico Madrid, Chelsea, Real Madrid and Barcelona), and several others teams have already implemented this strategy (such as Juventus, Arsenal, Bayern Munich and Palmeiras).

This research will focus if football teams that decided to change their stadiums suffered an impact on their historic home results. The following sections of this chapter will present the proposed research question, aim and objectives and a summary for the next chapters of this dissertation.

1.3. Proposed Research Question, Aim and Objectives

The research question that this study will seek to address is the following:

Is there a significant impact in the home team results of football teams that decided to renovate or build new stadiums?

The decision to change the current stadium is subject of strong debates between the large pool of stakeholders involved in a football club, like players, league and federations, local authorities, supporters and shareholders when applicable (Senaux, 2008). Although extensive, literature over the development of new stadiums is fundamentally built on aspects that are not mainly related to sportive reasons, as Chapter Two of this dissertation will cover. As the main focus of this research is to search if there is a relation between new stadiums and an increase or decrease in a football club sports results, one opportunity to fill a gap might have been found.

Consequently, the aim of this research is to identify another component issue of this relevant transition made by some football teams, investigating if there is a change in behaviour of football results in different contexts. In addition, in order to answer the overall research question and identify tasks that need to be undertaken, objectives were selected (Tenenbaum and Driscoll, 2005), as presented above:

- Collection of relevant database of football results, especially in Europe and South America, and variables.
- Examination of the relationship between football clubs results when playing at home at different stadiums (previous ground and new or reformed stadium).
- Identification of relevant measurement of variables in order to understand the Home Advantage concept practically.
- Conduct of relevant statistical analysis to explore the relationship between new stadiums and Home Advantage.

1.4. Summary of chapters

In order to present a coherent dissertation, the following chapters will cover a literature review on the topic, exposed by Chapter Two, all the methodology adopted for the research, demonstrated through Chapter Three, the analysis of the results, outlined by Chapter Four, and Chapter Five will bring the conclusions.

Chapter Two: Literature Review

2.1. Introduction

On March 6th 2017, London Mayor Sadiq Khan approved the plans for the new stadium of Chelsea Football Club (BBC News, 2017). Thus, following examples as Tottenham's White Hart Lane, Atletico Madrid's Vicente Calderon and Borussia Dortmund's Westfalenstadion, the Stamford Bridge stadium will soon be replaced by a modern *arena*.

In order to evaluate the motivations for this redevelopment strategy adopted by many clubs, subsection 2.2 of this chapter will provide a brief discussion on why football clubs change their stadiums. Also, to evaluate the impacts of this change in terms of sports results, the Home Advantage (HA) concept will be firstly introduced in subsection 2.3 and debated in relation to its impacts on a football team success, as presented in subsection 2.3.1, and regarding the influences of football stadiums in a club Home Advantage, showed in subsection 2.3.2.

Through the structure presented above, the main gap intended to be analysed by this literature review is to relate the football stadium redevelopment strategy to the sport performance of home teams. In this sense, it is important to clarify the main reasons behind this decision to change stadium and also relate it to the impact that stadiums have or not in a club's results, measured mainly through the Home Advantage concept.

2.2. Why do Football teams change their stadiums?

Although each football club have their particular reasons to change or renovate their stadiums, it is possible to divide these into two main categories: the search for an increase in revenues and to meet regulatory requirements. Regarding the first category authors like Bale (2000), Bulley (2002) and Thomas et al. (2012) discussed the impacts of new stadiums on club's financial structure. As most of the new constructions represent an upgrade in comparison with the previous home, especially in terms of comfort and higher attractiveness potential towards different types of consumers, a new ticket pricing strategy leads to an increase in revenues.

Noll and Zimbalist (2011) pointed out that different sources of revenue related with sport stadiums have changed through time, evolving from traditional ticket selling-only income to large amounts of money generated through the exploitation of sources of revenue ranging from concessions (i.e. food and beverage providers) to special seating. As Feddersen et al. (2006)

concluded, effects resulted from an increase in income from stadium construction and reconstruction essentially result not from the fact that more football fans are able to experience the game live, but rather that the buying power of a relatively low number of wealthy spectators is absorbed more effectively, which can be reached mainly through new stadiums infrastructure, exclusively designed for this purpose.

Secondly, regulatory requirements were significant tools that led to changes in stadiums structures as Baimbridge et al. (1996), Bale (1993) and Elliott and Smith (1993) pointed out. One practical example is the Taylor Report (1990), commissioned by the English Government after the Hillsborough disaster, it has obliged football clubs to invest in all-seated stadia which has had the side effect of modernising the facilities, making them more attractive to the audience (Szymanski, 2010). Another example is the FIFA standard requirement designed for World Cup games, which has led to considerable transformation in football club's stadium, especially in recent competitions. Some clubs as Germans Borussia Dortmund and VfB Stuttgart and Brazilian SC Internacional adapted their previous stadiums in order to host World Cup games (Branski et al., 2013).

Lastly, it is important to highlight the role of football stadiums on urban economies regeneration as an incentive for the decision to change or renovate stadia, as discussed with relevance by Gratton and Henry (2001), Baade and Dye (1990) and Thornley (2002). In some cases, this is the main motivator factor for the decision to change or renovate the stadium and its surrounds, especially if the area received investment from the public sector aimed at hosting a mega-sports events. Motivated by the potential increase in image and in economic activity, public subsidies are still a common practice adopted by mega-event hosting nations (Baade and Matheson, 2004). However, several aspects that compound the investment agenda of a hosting nation, especially in terms of infrastructure and securitisation (Giulianotti and Klauser, 2010), are difficult to predict and requires substantial allocation of resources, resulting in a scenario of uncertainty of returns of public investments, as recent observed in 2010 South Africa World Cup (Cornelissen et al., 2011).

2.3. Main Review – Home Advantage

According to Courneya and Carron (1992, p.13), “Home Advantage is the term used to describe the consistent finding that home teams in sports competitions win over 50% of the games played under a balanced home and away schedule”. Although relatively outdated, this definition still is commonly used in studies on the topic (Goumas, 2014a; Allen and Jones, 2014) and delivers the concept with accuracy, clarifying that this phenomenon is robust and consistent (Page and Page, 2007). Regarding football, Jamieson (2010) meta-analysis exposed that it is the sport that produced larger home-field advantages compared to any other.

In this sense, Pollard (2008) identified different determinant factors impacting a football match, including crowd and travel effects, referee bias, territoriality, special tactical strategies, rules factors and psychological causes. Despite the fact that the impacts of each of the determinant factors were concern of different studies (see Riedl et al., 2015; Brocherie et al., 2015; Staufenbiel et al., 2015), it is possible to attribute the existence of the HA phenomenon to the combination of aspects within a football match (Pollard and Gómez, 2014b). However, in order to measure the impacts on HA in case of a redevelopment of a club home stadium, two main issues were selected to be discussed: if a club’s success is directly related to its Home Advantage and how a particular stadium can influence HA.

2.3.1. Impacts of Home Advantage in a team success

The Uncertainty of Outcome (UO) concept has been analysed through economic, psychological and theoretical bias. Knowles et al. (1992) definition relates the topic to the assumption that sport fans perceive more utility from observing contests with an unpredictable outcome. The impacts of this phenomenon, however, are subject of different conclusions. As Buraimo and Simmons (2008) selected, the literature covers several possibilities, including that an increased outcome uncertainty raises attendance demand and interest or reduces attendance demand/interest (see Pawlowski, 2013). As attendance and crowd behaviour impacts Home Advantage, there is a clear link between UO and HA, related to the presence or not of supporters.

Although with inconclusive measurement of its impacts, Uncertainty of Outcome is a pivotal aspect in football analysis. Whilst unpredictable, a football club can mitigate the risks involved in a match in order to obtain better results. Many studies were focused on the main factors of

a club on-field success, for example the applications of the Data Envelopment Analysis (DEA) methodology for evaluating a club's results. As presented by Villa and Lozano (2016), it is possible to measure performance efficiency through economic indicators and sports factors, both aspects in which the Home Advantage phenomenon has relevance.

Regarding the sportive point of view, it is possible to quantify the importance of playing at home through the observed margin of 60% of all goals scored in both Italian and Spanish leagues during three relatively recent seasons were obtained at home, while 40% of goals conceded occurred in home games (Boscá et al., 2009). Goals are not the only, but an important component of success in football production functions.

Also, in accordance to Gelade (2015), some stadium characteristics can influence two of the determinant factors of HA, the referee bias and the familiarity with pitch dimensions and surface. As stated by Goumas (2014b), stadia where a running track separates the crowd from the pitch presents significantly lower HA, potentially because of the reduced influence of the crowd not only in the game but on the referee decision making process. In this sense, there is evidence of an important role played by the stadiums in a team success.

As the existence of HA is solid, it is possible for football clubs to understand its major factors and manage it in order to achieve a greater advantage in their home games (Nevill and Holder 1999). By increasing their possibilities of a better team and individual performances, football clubs can also increase their number of goals and victories, crucial successful factors for the sport analysis. Inserted in this context, Home Advantage can be considered a key factor for a team success.

2.3.2. Impacts of Stadiums on Home Advantage

Among the identified factors that are consequential for the Home Advantage to occur it is possible to infer that the local crowd support, familiarity with local conditions, territoriality, travel fatigue and psychological issues are directly correlated with the place where a match is taking place. Regarding the *crowd*, Smith (2003) had expanded the debate created by the belief of athletes that fans can influence their performance and also the belief of fans that they can influence the outcomes of sporting contests by exposing how social belonging and community

sense (easily translated as rituals and ceremony during matches) are relevant to an understanding of how teams can receive a competitive advantage from the home crowd.

In addition, Ponzio and Scoppa (2014) exposed that the actual impacts of the *facility familiarity* factor in HA, usually connected with physical characteristics associated with the home facility that should result in the home team having an advantage over visiting teams, are in fact related with the point that a facility may serve as the umbrella under which other and more influential home factors, like mental states that cut across players, coaches, officials and the crowd, can interact. Therefore, it is possible to conclude that the stadium is the congruence point that allows the main factors of Home Advantage to happen.

The stadium is the place where a set of habits, behaviours and interactions with people and space are re-enacted by fans on match days, which helps to create a sense of belonging among fans of a same club (Edensor, 2015). However, the atmosphere created by the supporters, factor that impacts HA, is being affected by actions taken by the clubs in attempts to follow more modern management trends that results in a search for an increase in their finances, especially in terms of modernisation or reallocation of facilities (Kiernan, 2015). Although successful in terms of attendance and number of supporters, this trend is affecting the atmosphere, resulting in stands with less interactions and impacts on the match (Turner, 2017). In response, it is possible to see an increase in movements against this “modern football”, mostly motivated by supporters that seek to transcend and change contemporary football culture, more quiet and cold (Numerato, 2015).

Expanding the *crowd* and *psychological* factors, the explanatory relevance of the sociological aspects of Home Advantage can be eroded by changes in those same social processes. Effects like gentrification and players transfer market expansion (resulting in an intense change of squad members) can also affect a club representation of its local community (Cleland and Cashmore, 2016), reducing fans support and influence on the game and consequently affecting HA. A change in stadium is directly related with these effects.

2.4. Conclusion

The present literature review presented some of the main reasons involved in the increasingly relevant strategy for changing or renewing stadiums adopted by some of the most relevant football clubs in the current sport scenario. Two different types of motivation were observed: to search for an increase in revenues and to meet regulatory requirements, like FIFA standard requirement or Taylor Report.

Among the reasons for the implementation of this strategy, some crucial factor is being missing by football clubs: if there is an impact on the most important activity performed by the clubs: the sportive results. Measured through the Home Advantage phenomenon, crucial for a team success, there is evidence (not only in football) of a substantial role played by the stadiums in a team performance.

Chapter Three: Methodology

3.1. Introduction

Tenenbaum and Driscoll (2005) proposed the importance of a logical structure related to the exploration of the theoretical framework that drives the research process. It was pointed out that one key aspect of the research process is to identify an appropriate structure that need to be followed before the start of any collection of data or analysis of the research question. Thereby, using some of the concepts presented in this framework structure, this chapter will firstly provide the philosophical underpinnings of the research through section 3.2, the strategy and design intended to be used, section 3.3, and an explanation about what is the population and samples selected for the study, exposed by section 3.4. Finally, section 3.5 will outline the data collection instrument and analysis, proceeded by a commentary related to the research quality in section 3.6 and a conclusion.

3.2. Philosophical underpinnings of the research

With the intention to introduce two of the most relevant constituent features of a research project, it is necessary to discuss primarily the ontological and epistemological foundations that are present in this dissertation (Gratton and Jones, 2010). This study is based on samples of football games results that were already played. Also, as the research is interested in the comparison of situations (games played in different facilities) it is possible to conclude that the nature of the studied reality exists independently of this project. Therefore, the objectivist point of view is the most appropriate ontological position to be adopted (Saunders et al., 2016).

The knowledge that comes with this research can only be reached through direct observation, examination and comparison of data. These methods are characteristics of empiricism and rationalism, the epistemological approaches that are more appropriate in this specific case (Bryman, 2016).

3.3. Research Strategy and Design

The following sub items represents strategic steps that were adopted in this study before the collection of data and actual description of the research strategy and design, and were based on the research question proposed in the first chapter.

3.3.1. Observational strategy

As the primary aim of this research is to investigate the relationship between Home Advantage and different stadiums, the non-experimental observational design is the most appropriate. In this sense, among the different types of strategies, the longitudinal design is more suitable.

This strategy intends to be used once the sample covers results of football games played in different stadiums over different periods of time. Each of the analysed clubs had a number x of games played in their new stadium compared with the same number x of games last played in their previous venue. It is important to clarify that the clubs moved in different moments. For example, Arsenal played their first league game in the Emirates Stadium in 19/08/2006, while Juventus opened Juventus Stadium in a Serie A match only in 11/09/2011. Therefore, the team's samples will be treated separately, with different periods of time for each club.

3.3.2. Logic of inference

Through the collection and further analysis of the selected data, this study intends to reach a conclusion that could help football clubs in their decision-making process regarding adopting a strategy to move or renovate stadia. In order to reach such conclusion, both induction and deduction logics of inference can be used.

It is possible to associate the deduction logic with the present research mainly because of the use of logical theory in the data analysis. For example, if among the selected clubs the observed performance increased in their new facility in comparison with the previous venue, it is possible to deduct that the impacts of the new stadium in Home Advantage were relevant in a sense that the club's now have a better performance in home games.

However, induction is also necessary once the general conclusion can only come from a specific observation. For example, the number of points obtained by a team in the new stadium is lower than in the previous one. Also, the use of statistical inference is fundamental to answer the research question properly.

3.3.3. Data

In order to reach a conclusion over the proposed research question it is necessary to adopt a quantitative approach. The possibility of measuring a football club performance through the number of points obtained in a game (3 points for a victory, 1 point in case of draw and no point in case of a defeat) is what justifies the use of this approach. Thus, all the data required need to be based on numerical values attached to the measurement of variables, primary characteristic of quantitative data.

3.3.4. Strategy and Design

It is now possible to conclude that the present research strategy and design are related with the hypothetico-deductive approach. As stated by Blaikie (2000, pp.105), “in this approach to the generation of new knowledge, data are used in the service of deductive reasoning, and theories are invented to account for observations, not derived from them”.

This approach is necessary as the deductive logic derived from a quantitative data will be used in order to test the theory related to the Home Advantage concept applied in different football stadiums. Hence, the hypotheses generated will produce an attempt to answer the research question.

3.4. Sample and Subjects

As the research problem relates football matches played in different venues, it is possible to infer that the population in which the sample will have to be selected is based on clubs that performed in different or in considerable renewed stadiums. Also, as this strategy to redevelop stadia has become common among football clubs in the 21st Century (Chierici, 2016), more recent events have been privileged over older results.

Therefore, although clubs like FC Barcelona, Real Madrid or Manchester United invested in improvements and maintenance in their facilities, only football clubs with a substantial redevelopment of their previous stadium were selected. The segment of the population selected for investigation is based on elite clubs from top European leagues like English Premier League, German Bundesliga, French Ligue 1 and Italian Serie A (Szymanski, 2016) plus the Brazilian league, due to the significant number of new stadiums that were built with the purpose of hosting the 2014 World Cup. Also, the sample considered only league games for complete seasons.

A total of 1,550 games played until the end of the 2016/2017 season (2016 season in case of Brazil) from Juventus (Italy), Nice (France), Bayern Munich (Germany), Arsenal (England), West Ham (England) Palmeiras (Brazil), Grêmio (Brazil) and Corinthians (Brazil) were selected for the analysis. In addition, the total number of each club complete seasons played in the new corresponding stadium was the same for those played in their previous venue. For example, Bayern Munich opened their stadium in the 2005/2006 season, playing a total of 12 complete seasons at Allianz Arena until the end of 2016/2017 season. Therefore, games from the last 12 seasons starting from 2004/2005 were selected to be compared in this case. For each of the selected games, the sample shows the date, opponent, final result, venue, attendance and percentage of stadium occupation.

3.5. Methods

This study will make use of secondary data. The analysis will be all based in past football results provided by the websites www.transfermarkt.co.uk and www.soccerway.com. It is a clear example of unobtrusive method, in which any kind of interaction between the researcher and subject is required (Gratton, and Jones, 2010).

As exposed in Chapter Two, the Home Advantage phenomenon is impacted by several aspects related to a football match that can vary, for example, from referee bias to crowd behaviour. In this sense, as this study will demand a comparison between observed HA it is important to clarify how HA is calculated. As stated by Staufenbiel et al. (2016), different measures have been put forward to quantify Home Advantage, fact that have been subject of disagreements between authors like Saavedra García et al. (2013) and Gómez and Pollard (2014).

However, this study will quantify Home Advantage through the home performance of a club, measured by the number of points obtained in home league games for each selected period. As stated by subsection 3.3.1., the chosen teams have different time periods. Arsenal, for example, has 209 league games played in Emirates Stadium until the end of the 2016/2017 season. Therefore, the total games for this club is 418 (209 in new stadium + 209 in old stadium). The same logic was adopted for every club in the sample.

Alongside performance, crowd size also has a strong influence on Home Advantage (Goumas, 2013). Hence, information regarding the attendance is also present in the sample, demonstrated through the attendance of each home game. However, as many of the new facilities selected for the analysis increased the capacity in relation to the previous venue, the information of percentage of occupation (average attendance / total stadium capacity) is an appropriate measure to quantify crowd size and influence on home advantage.

In order to estimate if a change in the stadium had an impact on the performance of a team, a regression analysis will be used. The depend variable is performance, measured by the number of points obtained per match, and the independent variables are venue, percentage of stadium occupation and a control variable that shows the result of the team in the last match, necessary to captures the form of the team and controlling possible *momentum*. It is important to clarify that the independent variable venue is in format of a dummy variable, scored 1 when the game was played in the new stadium and 0 in the old stadium.

3.5.1. Measurement of variables

The measurement of variables will take place using IBM SPSS software. The results of the regression analysis need to be analysed in order to relate the effects of playing in different stadium in a club performance, controlling effects of venue and crowd size, similar to what Pollard and Gómez (2014a) introduced in the comparison of HA in men's and women's football leagues in Europe. The information about each club regression model, like regression coefficients for the independent variables and the constant, significance level and goodness of fit statistic are crucial for the formulation of an answer to the topic.

Hence, this measurement procedure is related to the research question through the formulation of a hypothesis that can be demonstrated as the null hypothesis being the equal relationship between Home Advantages before and after the change in stadia. Since the effects of new facilities in HA are uncertain (Pollard, 2002; Carmichael and Thomas, 2005), a two-tailed test should indicate an alternative hypothesis with a different than zero relationship, as presented below:

H₀ (Null Hypotheses): $\beta_2 = 0$

H₁ (Alternative Hypotheses): $\beta_2 \neq 0$

3.6. Research Quality

This study has a purpose to analyse football results. Therefore, all the collected data intended to be used will come from actual games results. In terms of reliability, it is possible to conclude that the consistency of the sample is assured and respecting stability, inter-observer and test-retest reliability (Bryman, 2016). Regarding the validity of the data collection it is expected that through football results it is possible to find face validity, content validity and predictive validity, as the research conclusion will approach a behaviour that can be used to predict future consequences on new stadiums (Gratton and Jones, 2010).

3.7. Conclusion

The research process requires determined steps to be followed in order to explain the problem proposed through the research question. Making use of some tools exposed by this theoretical structure, this study is based on longitudinal observational strategy and hypothetico-deductive approach with the purpose of analyse a series of quantitative data in form of football matches played in different stadium and reach a conclusion about the effects of facilities in Home Advantage. Although extensive, HA can be calculated through performance in home games and affected especially by venue and crowd size, in a sense that it is possible to infer its effects after a change in stadium, as the next chapter will demonstrate.

Chapter Four: Analysis

4.1. Introduction

This chapter outlines an application of the research process provided in the previous chapter to answer the research question (Bryman and Cramer, 2011). In this sense, four main sections form the structure of the chapter, beginning with section 4.2: Analysis Strategy, that indicates the procedures adopted to reach a conclusion on the research question, followed by sections 4.3: Review of Data and 4.4: Results, in which the data will be outlined accordingly to statistics patterns. Before the conclusion, section 4.5 will report all the tests and expose the findings.

4.2. Analysis Strategy

The statistical analysis is essentially based on the research question presented in Chapter One and restated here: *Is there a significant impact in the home team results of football teams that decided to renovate or build new stadiums?* The quantitative approach adopted to solve this question is based on the regression equation (1) demonstrated below that is related to key elements presented in Chapter Three, mainly the identification of the dependent variable and independent variables.

In this case, a club performance is the dependent variable Y , while venue, percentage of stadium occupation and points obtained from the previous match are the independent variables X_1 to X_4 . It is important to clarify that X_2 is a dummy variable scored 0 when the match was played in the old stadium and 1 in the new stadium. X_4 is a control variable that seeks to identify possible *momentum* that could represent a variation in a club normal performance. Also, once there is a considerable time gap between the last game of a season and the first game of the subsequent season, the first observation of the season is omitted each time. β_1 to β_4 are parameters to be estimated, t are units of analysis, in this case each club's sample of games over the seasons, and ε the random error term (Downward, 2016).

$$Y_t = \beta_1 + \beta_2 \text{venue}_t + \beta_3 \% \text{occupation}_t + \beta_4 Y_{t-1} + \varepsilon_t \quad (1)$$

The analysis strategy is based on the hypothesis test that can be generated, demonstrated below. As for the research question, if the null hypothesis is rejected, there is an indication that a football club performance is affected by a change in stadium.

$$H_0: \beta_2 = 0$$

$$H_1: \beta_2 \neq 0$$

4.3. Review of Data

Although the sample is formed by a considerable number of football games, it only covers eight football clubs from five countries, as outlined in Chapter Three. Hence, the analysed data can show a behaviour observed by these clubs but may not be applicable to every situation in which a club builds a new stadium. However, the selected clubs are relevant in football scenario and the analysis of data will generate a conclusion that can be expanded to the situations in which a team decide to build a new stadium.

Nevertheless, some cases showed some peculiarities. Bayern Munich and the German Bundesliga does not disclose the exact number of attendance in home games. Therefore, this club sample shows the official approximation of supporters per match. Also, Brazilian teams, especially Palmeiras and Corinthians, played games in several different stadiums before the conclusion of their new home facility, an unusual strategy adopted that needed to be controlled by the sample. Finally, both Juventus and Palmeiras played the second division during the selected period (and were promoted right after the relegation), which resulted in one year facing less qualified opponents.

But even with some particularities from each sample, the data were collected following the research instrument outlined in Chapter Three. After the full collection of 1,550 games, each club sample was analysed using IBM SPSS software.

4.4. Results

The regression statistics for each club are demonstrated through the tables below. The estimated regression coefficients for the independent variables and the constant are first showed, followed by their asymptotically normal z -scores, measures of the contribution that the predictor has in the model, and the respective p -values, which represents the significance level in which the null hypothesis can be rejected. This occurs every time this value is lower than .05. The bottom part of the table reports the number of games in each club sample and the goodness of fit statistic, measured by the R^2 , that tell us how much variance is explained by the model compared to how much variance there is to be explained (Field, 2013), and the F test value and significance, if the explanation is statistically significant with a particular p -value associated with it.

Table I: Results of regression analysis for Arsenal

Independent Variables	Coefficient	z -score	p -value
Venue	-0.045	-0.392	0.695
% of Occupation	-6.073	-1.103	0.271
Control variable $t - 1$	-0.061	-1.223	0.222
Constant	8.449	1.554	0.121
n	418		
R^2	0.0084		
F test	1.101		
F ratio sig.	0.349		

The independent variable Venue represents games played in Highbury Stadium, previous home of Arsenal, and Emirates Stadium, officially opened for league games in 19/08/2006. The percentage of occupation represents each game attendance divided by the stadium capacity.

Table II: Results of regression analysis for West Ham

Independent Variables	Coefficient	<i>z</i> -score	p-value
Venue	-0.798	-0.595	0.556
% of Occupation	4.657	0.039	0.969
Control variable <i>t</i> -1	-0.245	-1.432	0.162
Constant	-2.294	-0.019	0.985
<i>n</i>	38		
<i>R</i> ²	0.1264		
<i>F</i> test	1.543		
<i>F</i> ratio sig.	0.222		

The independent variable Venue represents games played in Boleyn Ground, previous home of West Ham, and London Stadium, officially opened for league games in 21/08/2016. The percentage of occupation represents each game attendance divided by the stadium capacity.

Table III: Results of regression analysis for Bayern Munich

Independent Variables	Coefficient	<i>z</i> -score	p-value
Venue	0.194	1.505	0.133
% of Occupation	-0.417	-0.943	0.346
Control variable <i>t</i> -1	-0.074	-1.462	0.144
Constant	2.864	7.598	0.000
<i>n</i>	408		
<i>R</i> ²	0.0105		
<i>F</i> test	1.346		
<i>F</i> ratio sig.	0.259		

The independent variable Venue represents games played in Olympiastadion, previous home of Bayern Munich, and Allianz Arena, officially opened for league games in 05/08/2005. The percentage of occupation represents each game attendance divided by the stadium capacity.

Table IV: Results of regression analysis for Nice

Independent Variables	Coefficient	<i>z</i> -score	p-value
Venue	0.339	1.479	0.141
% of Occupation	-0.590	-0.793	0.429
Control variable <i>t</i> -1	0.017	0.199	0.842
Constant	1.811	4.700	0.000
<i>n</i>	152		
<i>R</i> ²	0.0164		
<i>F</i> test	0.778		
<i>F</i> ratio sig.	0.508		

The independent variable Venue represents games played in Stade du Ray, previous home of Nice, and Allianz Riviera, officially opened for league games in 22/09/2013. The percentage of occupation represents each game attendance divided by the stadium capacity.

Table V: Results of regression analysis for Juventus

Independent Variables	Coefficient	<i>z</i> -score	p-value
Serie B	0.789	2.804	0.006
Olimpico	-0.851	-2.224	0.027
Juventus Stadium	-0.098	-0.236	0.814
% of Occupation	0.801	0.935	0.351
Control variable <i>t</i> -1	0.053	0.769	0.443
Constant	1.948	4.073	0.000
<i>n</i>	230		
<i>R</i> ²	0.1377		
<i>F</i> test	6.769		
<i>F</i> ratio sig.	0.000		

As Juventus played in more than one venue before the conclusion of the new facility, the independent variable Venue was transformed in each stadium played, in this case Delle Alpi, Stadio Olimpico and the new Juventus Stadium, officially opened for league games in 11/09/2011. It is important to report that SPSS software automatically excluded Delle Alpi variable as a measure to identify the model. Also, as the club played the Italian second division in season 2006/2007 another variable, called Serie B, was included in the model, as the level

of the opponents tend to be lower in comparison with the first division, which could potentially affect the behaviour of the club performance if compared with all other seasons in the sample.

Table VI: Results of regression analysis for Palmeiras

Independent Variables	Coefficient	z -score	p-value
Serie B	0.767	1.556	0.125
Novelli Jr	-1.009	-0.641	0.524
Prudentão	-1.275	-0.809	0.422
Pacaembu	0.064	0.047	0.962
Café	0.647	0.406	0.686
Fonte Luminosa	0.452	0.272	0.786
Allianz Parque	0.783	0.539	0.592
% of Occupation	-1.651	-1.544	0.128
Control variable $t - 1$	0.190	1.416	0.162
Constant	2.060	1.489	0.142
n	76		
R^2	0.1507		
F test	1.222		
F ratio sig.	0.298		

In Palmeiras case, six different stadiums received games before the opening of Allianz Parque in 20/11/2014. It is important to report that SPSS software automatically excluded Morenão variable as a measure to identify the model. Also, as the club played the Brazilian second division in the 2013 season, the Serie B variable was also included in the model, using the same logic as Juventus example.

Table VII: Results of regression analysis for Corinthians

Independent Variables	Coefficient	z -score	p-value
Novelli Jr	-0.102	-0.057	0.955
Vail Chaves	-1.081	-0.719	0.475
Pacaembu	-1.482	-1.093	0.279
Canindé	-1.062	-0.688	0.494
Fonte Luminosa	-1.111	-0.709	0.481
Arena Corinthians	-0.835	-0.653	0.516
% of Occupation	0.187	0.186	0.853
Control variable $t - 1$	0.009	0.062	0.950
Constant	2.944	2.429	0.018
n	76		
R^2	0.0667		
F test	0.563		
F ratio sig.	0.804		

Similar to Palmeiras, Corinthians also played in six different stadiums before the opening of the new Arena Corinthians, in 18/05/2014. It is important to report that SPSS software automatically excluded Arena Pantanal variable as a measure to identify the model.

Table VIII: Results of regression analysis for Grêmio

Independent Variables	Coefficient	z -score	p-value
Olímpico	0.079	0.091	0.927
Arena do Grêmio	0.031	0.035	0.972
% of Occupation	0.111	0.202	0.840
Control variable $t - 1$	-0.119	-1.382	0.169
Constant	2.296	2.511	0.013
n	152		
R^2	0.0143		
F test	0.505		
F ratio sig.	0.732		

Grêmio played in two different stadiums before the opening of the new Arena do Grêmio, in 06/05/2013. It is important to report that SPSS software automatically excluded Alfredo Jaconi variable as a measure to identify the model.

4.5. Analysis

Although analysed individually, it is possible to affirm that the observed values for the coefficient of determination (R^2) in the whole sample were very low. This shows that the amount of the variation in the dependent variable explain by the independent variables was low (Bryman and Cramer, 2011). In other words, it is an indication that the model developed does not fit the data in a satisfactory way, because only 1.05% of the variation of Bayern Munich's home performance, for example, is explained by venue, percentage of stadium occupation and points obtained from the previous match.

In this sense, in accordance to what Pollard stated as an "unsolved puzzle" (2008, pp. 12), there must be other variables that have an influence in performance than only the selected ones. As discussed in Chapter Two, several other elements like travel effects, referee bias and special tactics may impact performance more consistently than the stadium, as well as the whole interaction of causes involved in a football match.

Another indication that corroborates with this statement is that among all clubs, only Juventus has shown a significant F ratio ($p < .001$). A non-significant ratio means that there is no significant impact on club performance by the selected independent variables. The coefficients and the regression equation itself has not achieved a high level of statistical significance.

It is also important to highlight that before the opening of Juventus Stadium, the Italian club has faced a period of finance and sportive restructuration as a result of the *Calciopoli* scandal (Buraimo et al., 2016) and after the new facility inauguration the club won the league six times in a row, a record in Serie A. This unexpected success may have impacted the results. However, through the other seven club's analysis it is possible to conclude that the stadium did not impact performance significantly.

The results for each independent variables test statistic also shown that the model would be unlikely to fit in this case. The results for each club regression analysis shows a p-value greater than .05 for almost all variables, resulting in a non-significant test statistic and therefore rejecting the alternative hypothesis, in which different stadiums would influence performance. The non-significant result, however, should not be interpreted as no relationship between variables (Field, 2013). There is an impact caused by stadia, but not consistent enough to influence performance.

As Home Advantage is mainly measured by performance in home games and the data analysis had produced results that could not significantly associate the impacts of a change in facility in home results, the research question can now be answered. There is no evidence that a change in stadium could affect the home results of a football club that decided to build a new stadium. The strategy to move, most recently adopted by clubs that seek better commercial results, especially, will not impact the sport performance, which is affected by different reasons than the venue only.

4.6. Conclusion

In order to investigate the topic presented by the research question, this chapter sought to link the procedures of the research process outlined in Chapter Three with the quantitative nature of the data collected. As a result, a regression equation was formulated using a club home performance as a dependent variable and venue, percentage of stadium occupation and points obtained from the previous match as independent variables.

The longitudinal design adopted was present through all the data collection process, resulting in a large sample of football games played in both old and new stadiums of eight clubs from five different countries. The data was treated using IBM SPSS software and produced results that showed the estimated regression coefficients, with the respective z-scores and p-values, the number of games in each club sample and the goodness of fit statistic.

The analysis of the results has showed that new stadiums do not impact home performance significantly, therefore illustrating that there are no evidences that Home Advantage is affected when a football club moves to another facility. This may represent some good news for football clubs that are looking for ways to increase their revenues, but a sad reality for more nostalgic football fans, emotionally attached to their home ground and afraid to face the modern environment of the game, filled with commercial needs, expensive tickets and transforming the spectator in a commodity (Giulianotti et al., 2015).

Chapter Five: Conclusions

5.1. Introduction

The last chapter of this dissertation is structured in order to present the main aspects discussed by this study. Thereby, section 5.2 restates the research question, aim and objectives introduced in Chapter One and section 5.3 provides the main findings and discussions presented in each chapter. In addition, section 5.4 addresses the relevance of this research, especially in terms of the decision to build or renovate new stadiums, strategy that is being adopted by a considerable number of football clubs. Finally, section 5.5 contains limitations of this study that must be taken into account.

5.2. Research question, aim and objectives

The research question that guided this study was the following:

Is there a significant impact in the home team results of football teams that decided to renovate or build new stadiums?

The main motivation for it was to search if a club has its performance affected when it moves to a new stadium. In this sense, the aim of this research was to identify another component issue of this recurrent and relevant transition strategy adopted by football clubs, including the sport performance as a factor that could impact the decision making process.

Hence, the selected research objectives were:

- Collection of a relevant database of football results, especially in Europe and South America, and variables.
- Examination of the relationship between football clubs results when playing at home at different stadiums (previous home and new or reformed stadium).
- Identification of relevant measurement of variables in order to understand the home advantage concept practically.
- Conduct of relevant statistical analysis to explore the relationship between new stadiums and home advantage.

5.3. Summary of chapters

The topic of this research is based on the fact that several football clubs are interested in building new stadiums. Only in Europe, a considerable number of relevant teams, like Chelsea, Tottenham, Roma, Atletico Madrid and Feyenoord have already received the official approval to start building their new ground, while others like Real Madrid, Barcelona, Milan and Everton have recently declared their intention to replace their current homes.

The adoption of this strategy to build or renovate a stadium is fundamentally based on two reasons: a search for an increase in revenue and a need to adapt regulatory requirements. The impact of a new facility on club's financial structure is related to the fact that these modern constructions represent an upgrade compared to the previous one, allowing clubs to offer a better consumer experience and to explore commercial tools that were almost incipient not so long ago, like naming rights, special seating and food concession (Lee et al., 2012).

However, none of these aspects is focused on the core activity performed by a football club: the game. In order to measure the impacts of this stadium change in a club performance it is necessary to introduce the Home Advantage concept into this discussion. HA is a robust and well-documented phenomenon that occurs in sport, in which a team wins more games played at home than away, with football being the sport that produces a larger home-field advantage compared to any other. Home Advantage is a key factor for a team sportive success and is affected by a large number of elements, like crowd effect, referee bias, familiarity with local conditions and travel fatigue. Therefore, the impacts of stadiums in HA are relevant, once all the influential factors in the game can interact under this venue.

In order to explore the effects caused by a change in stadium, it was determined a logical structure that guided the research process. Based on the objectivist ontological position and empiricism and rationalism epistemological approaches, the longitudinal design was selected as the observational strategy to be followed. As a deductive logic derived from a quantitative data was used in order to answer the research question, the hypothetico-deductive approach was used in this study.

The data consisted of a total of 1,550 home games collected from eight teams that have recently changed stadium, alongside information about venue and attendance. The selected clubs were Juventus (Italy), Nice (France), Bayern Munich (Germany), Arsenal (England), West Ham (England) Palmeiras (Brazil), Grêmio (Brazil) and Corinthians (Brazil), all from relevant

leagues in Europe plus Brazil, that as a consequence of hosting the 2014 World Cup has a significant number of teams with new stadiums.

The method used to quantify HA was based on the number of points obtained by the teams in each match. Therefore, if this performance was significantly impacted by a different venue and its crowd effects it would be possible to conclude that a new stadium affects Home Advantage. In this sense, a regression analysis model was developed, with performance as the dependent variable and venue, percentage of occupation and a control variable that showed the result of the team in the last match as independent variables. The model was the following:

$$Y_t = \beta_1 + \beta_2 \text{venue}_t + \beta_3 \% \text{occupation}_t + \beta_4 Y_{t-1} + \varepsilon_t$$

Hence, the measurement of these variables was related to the research question through the formulation of a hypothesis test, restated below, in which the null hypothesis would represent no substantial impact on performance caused by a change in stadium. In case of a null hypothesis rejection, it would be possible to conclude that HA was affected.

H₀ (Null Hypotheses): $\beta_2 = 0$

H₁ (Alternative Hypotheses): $\beta_2 \neq 0$

Each club sample of games was analysed using IBM SPSS and the results showed some important facts. First, the proposed regression model does not fit the data with relevance, since only a small part of the variation in a club performance can be explained by the independent variables. This is an indication that other elements, or even the interaction of causes, may impact HA more significantly than only the stadium and its percentage of occupation. In addition, as the test statistic for the variables proved to be non-significant, the null hypothesis can't be rejected. This represent that there is no evidence that a change in stadium could affect the home results of a football club that decided to renovate or build new stadiums.

5.4. Implications of the research

The conclusion formulated through the regression analysis results indicates that renovates or build a modern stadium is a positive strategy to be adopted by football clubs, mainly because if well implemented, it can represent an increase in team's financial situation without impacting their performance. In the current context of football activity, this represents good news for both club's supporters and managerial board.

As Paché and Ika (2016) pointed out, football represents a powerful player in a very competitive entertainment industry. In this sense, it is crucial that efforts that seek not only to stimulate but to enhance consumer experience are made. A new stadium construction is a measure taken in this direction, since much of the relocation process is thought to produce a positive atmosphere towards the supporters (Edensor, 2015).

However, the emotional attachment carried by a football stadium is also relevant among fans. As Fillis and Mackay stated (2014, pp. 339), "the stadium is the home ground which needs to be defended by supporters in their imagined community against the opposition". Replace this ground adopting commercial motivations is a decision that requires great discernment from the management, whose actions should always seek to preserve the club identity in relation to the modernity state that the current football environment demands.

5.5. Limitations

One key element not approached by this research was the complexity related to production functions in football. The club performance was measured considering the number of points obtained in a home match. However quantitatively exact, this measure may not represent performance with accuracy (Anderson and Sally, 2013). Also, a higher percentage of occupation doesn't necessarily represent the effect of crowd in home games. In addition, the low coefficient of determination showed by the model suggest that other factors should be involved in order to measure the effects on Home Advantage, in accordance to what Goumas (2013) stated.

The calculation of Home Advantage based only in home games is also subject of debate. Although this research analysed games individually, Pollard and Gómez (2015) stated that performance at home has to be assessed against performance away from home for a proper measure of HA.

Regarding the sample, the selected teams inaugurated their new stadiums in different moments of time. This made each sample analysed individually, presenting results especially for the teams that not necessarily can be adapted to every club that adopt the strategy to relocate stadia. Also, as the number of clubs with new stadium tend to increase in next years, it would be necessary to adapt this study by increasing the sample, including clubs from more leagues as well.

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