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Keyword: Intangible assets, Brands, Competitive advantage.

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1 Introduction

Organizations competing in the market must adopt practices that guarantee their continuity and growth. Therefore, these organizations need to use some strategies, including innovation that is considered the main element of the economic development and prosperity of companies, industries and countries (Schettino, Sterlacchini, & Venturini, 2013).

Innovation is understood as the response of the creation of a new product or also a new quality of an existing product or process, providing direct and indirect effects on the growth of companies and contributing to the economic development of the country.

Innovation comes through different forms such as a new idea or behavior (Jiménez-Jiménez & Sanz-Valle, 2011) and affecting viability and serving as the driving force for economic and social changes (Santos, Hoffmann, Jara, & Coral, 2014). Companies that do not adapt to innovation and criteria established by the market certainly will face difficulties and fail (González-Fernández & González-Velasco, 2018).

Companies need to value their financial resources and invest efficiently because of the dynamism of the market. We highlight the intangible resources that are the knowledge, the experience of the employees, the reputation and the brands, for example, that increase the economic value of the company and create competitive advantage (Santos, Vasconcelos, & De Luca, 2013; Santos *et al.*, 2014).

According to Arrighetti, Landini, & Lasagni (2014) we can compare the investments in intangible assets as a product of a set of resources that are directly related to the innovation in the organizations, and thus are considered the main indicators that elevate the organizational performance (Liao & Rice, 2010). In other studies when intangible assets was use as a source of innovation, a positive impact on the performance of the company is perceived, improving its position in the market, also aiding in its competitive advantage.

The existence of the relationship between innovation and corporate performance is reflected in many studies that analyze different types of innovation and organizational typologies. According to Ecer & Boyuskaslan (2014), soccer clubs are growing more than other businesses in the last decades and undergo significant changes, because teams become competitive businesses, a good opportunity to make money without losing the essence of the world's most popular sport (Leite & Pinheiro, 2014), and becoming the main mean of generating revenues in the current market (Nicolau, 2011).

Thus, we understand that innovation and performance have any relationship with each other (Dimitropoulos & Koumanakos, 2015; Galvão & Dornelas, 2017; González-Fernández & González-Velasco, 2018; Rohde & Breuer, 2016; Surroca, Tribó, & Waddock, 2010), that football clubs are similar to large companies in relation to their assets (Ecer & Boyukaslan, 2014; Yang & Sonmez, 2005) and they need the financial resources to innovate. The present study asks: what is the influence of innovation on the performance of Brazilian Football clubs?

The purpose of this study was to analyze the influence of innovation on performance in Brazilian football clubs and has as an additional objective to outline the innovation profile in these clubs.

To achieve that, about 26 Brazilian football clubs were studied and these clubs participated once at least in the A series of the Brazilian Football Championship, in the years 2015 to 2017, having a proxies the representativeness of the intangible asset and the registration quantity of brands in each year of analysis. Performances are considered as financial, economic and financial contexts.

The research is different because of the characteristics of the models used, and the clubs analyzed were considered the best in Brazilian football and after the FIFA World Cup in 2014 the innovative and performance potential of these clubs has improved. Despite, recent research focuses on the analysis of publicly traded companies and foreign football clubs, for example. Besides, the study does not consider traditional proxies for innovation and performance, but it adopts the brand registration and the ranking of the Brazilian Football Confederation (CBF).

2 Literature review

2.1 Organizational innovation and its use of brands as a competitive differential.

Innovation is the implementation of a new or significantly improved product (goods or service), a process, a new marketing method or a new organizational method, in the organization of the workplace or in external relations (OCDE, 2005).

The federal law n° 10.973 on 2 December 2004 is about the incentive to innovation and scientific research in the workplace, defines innovation as the introduction of novelty or improvement in the productive or social environment, resulting in new processes or services (*Law 10.973/2004*).

Great companies need innovation, because many competing companies constantly present innovations in the market, being better to attract and maintain their customers.

In the current competitive market, business value changes from tangible assets such as real estate and machinery to intangible assets such as brands and patents, because the economic value of a business is the sum of all its tangible and intangible assets, and intangible assets are becoming more important in the commercial value of the companies, perceived by the growth of the market value related to the book value (Kayo, Kimura, Martin, & Nakamura, 2006).

Some renowned authors state that intangible assets create competitive differentials that are harder to copy. Patents, brands, copyrights or intellectual capital generate competitive advantages that are difficult to eliminate, for example (Perez & Famá, 2015).

And for this reason, the investments made by companies in intangible assets are increasing in recent years with a focus on knowledge in order to achieve excellent results.

Research and development investments generate competitive differentials through new products and / or services, know-how, brand appreciation, and development of new production systems. Companies are always introducing new features in the marketplace to attract and retain their customers through the use of their brands.

The brand is the most appropriate strategy by companies to differentiate themselves in the market, because it is the way of exposure of image with the stakeholders in demanding and competitive markets. According to the National Institute of Intellectual Property of Brazil (INPI) the brand is a differentiated sign, its main functions are to identify origin and distinguish products or services from other identical, similar products or services from different origins.

The brand is considered an intangible asset of the companies for presenting market value, some organizations focus their strategy basically on activities and research and development and the brand, in order to add more value to the products and services delivered to the market.

In the sporting context, specifically in soccer, teams do not have their brands valued, and are considered as secondary meaning. The secondary meaning is when a common sign devoid of distinguishability acquires entrepreneurial ability to differentiate a product or service while taking the protection of its brand. Football club brands are very important because companies relate the love of the club to products and services, thereby increasing the financial results. Sports sponsorship drives approximately \$ 50 billion annually worldwide, representing approximately 35% of the sports market, which also includes ticket sales, broadcasting rights and merchandising (Amorim & Almeida, 2017).

The results presented by the clubs attract large sponsorships and also develop partnerships with companies with brands with higher market potential.

For this reason, the pressure for results in football clubs is intense. The difference between football club and a company is in the immediate results. Usually companies evaluate results annually, while football clubs evaluate their results weekly. Football coaches are often criticized and even fired when there are no good results in a sequence of two or three games.

2.2 *The performance of Brazilian Football Clubs*

Performance-measurement studies confirm that effective management is achieved when a system of measures or performance indicators, financial or otherwise, is incorporated to confirm the alignment of activities with the objectives of organization (Dani, Kaveski, Santos, Leite, & Cunha, 2017; Pace, Basso, & Silva, 2003).

Football clubs are organizations similar to large corporations in relation to the structure of assets and these clubs organize and structure their operation through responsible management (Yang & Sonmez, 2005). With the advent of the club-business concept, football clubs became units with economic autonomy, which profit from the sale of goods and services to the community. Football clubs have created their own income and lines of business and have turned companies (Maia & Vasconcelos, 2016). It is possible to measure their performance by taking into account aspects related to internal and external environments, based on both the economic-financial question and the maximization of sporting achievements and performances (Dantas, Machado, & Macedo, 2015).

It is important for the manager to know the measures and indicators of organizational performance, and then select the ones that are more consonant with the reality of the company (Galvão & Dornelas, 2017). Financial statements are more reliable sources because they provide current and periodic information on the financial and economic status of organizations (Ecer & Boyukalash, 2014).

It is possible to trace new strategies when analyzing economic-financial performance, reshape operational policies and implement corrections or inefficiencies, while economic-financial indices are essential management tools and increase profits for organizations (Tian & Ketsaraporn, 2013). In this study we used the logarithm of gross revenue to measure financial performance (Galvão & Dornelas, 2017; Leite & Pinheiro, 2013; Rohde & Breuer, 2016). It is utilized return on net worth, represented by the profit and net worth, and it is also used to measure economic performance to demonstrate the profitability of resources invested (Santos, Góis, Rebouças, & Silva Filho, 2016).

The data and indexes collected in the structure of the financial statements are considered relevant, but to make an accurate assessment of the company's performance it is necessary to evaluate the financial and economic situation separately, and after the appropriate conclusions, effective decisions are taken (Antunes & Martins, 2007; Tian & Ketsaraporn, 2013).

Analyzing the sporting performance, the relationship between the performance in the games and the victory with the conquest of the titles in the championships has great positive impact in the increase of the profits of the football teams with the sale of tickets, partner fan, rental of the stadiums of football, sponsorships, games broadcasting revenues, merchandising and the sale of players (Rohde & Breuer, 2016). The ranking takes into account the ranking of the Brazilian Football Confederation, published on the institution's website, which establishes various scores for placement of the clubs in championships organized directly and indirectly by institutions (Dantas, Machado, & Macedo, 2015; Nascimento, Dantas, & Azevedo, 2019).

Thus, the next subsection lists national and international studies that discuss the relationship between innovation and performance, and with the review of the literature and with the result of these surveys a hypothesis is formulated.

2.3 Previous empirical studies and research hypothesis

This section presents previous empirical studies that investigated the relationship between innovation and performance in the business context and also in sports clubs and served as a basis for the elaboration of the research hypothesis.

The studies evaluated the effects of a company's intangible assets on the financial performance of 599 companies from 28 different countries (Surroca *et al.*, 2010). The authors used the Resource Based View (RBV) as a theoretical aspect and verified the existence of a positive influence of the intangible assets on the financial performance of the firms.

The data from the year 2015 with samples of 35 Brazilian football clubs from the A, B and C series, using Pearson's correlation, found no relation between the intangible, and it is a variable constantly used as proxy for innovation and performance measured by the total return on assets (ROA) and return on equity (ROE) (Cunha, Santos, & Haveroth, 2017).

On the other hand, the impacts of intellectual capital (innovation) on the profitability (performance) of 23 European football clubs in the years 2005 to 2010 were evaluated by other authors. There was a positive association between intellectual capital and profitability, that is, clubs that spend more with their employees (players, technical staff, etc.) add greater value to the organization (Dimitropoulos & Koumanakos, 2015).

Using data from the top 30 European football clubs from 2004 to 2013, it was evident that performance is improved with national and international sporting success, also by brand value, and this variable is used in several surveys as a proxy for innovation (Rohde & Breuer, 2016).

Using the Resource Based View (VBR) with samples of Brazilian football clubs between 2010 and 2013, and athlete as an intangible asset through a data analysis, it was verified that football clubs are not efficient in generating benefits, but the club revenues help to achieve better performance, assuming a relationship between innovation and performance (Galvão & Dornelas, 2017).

Intangible assets of Brazilian companies recorded in the financial statements presented a relationship between innovation and performance. The results of the studies suggest that there is a relationship between investments in intangible assets and organizational performance (Galvão & Dornelas, 2017).

In the relationship between corporate performance and innovation in Spanish companies, in the period 2007-2013, the authors found in a panel evidences that return on equity and in particular sales revenues are positively influenced by corporate innovation (González-Fernández & González-Velasco, 2018).

Based on foregoing analysis, football clubs resemble large companies in the structure of their assets (Nascimento *et al.*, 2017; Yang & Sonmez, 2005) and companies use intangible assets to develop innovation (Bartoloni, 2013; O'Brien, 2003; Teh, Kayo, & Kimura, 2008) and the following research hypothesis is developed: innovation influences the performance of Brazilian football clubs (H1).

3 Methodology

The study separates data from 200 Brazilian football clubs present in the ranking of the Brazilian Football Confederation in the year 2017. However, this study only considers the participating clubs of the Brazilian Championship series A from 2015 to 2017, totaling 26 clubs or 78 observations. The delimitation of time is for two reasons: the first reason is about the years after the 2014 FIFA Football World Cup, since

it is presumed the increase of the innovative potential and the performance of the clubs, taking into consideration the recommendation of the Oslo Manual (OECD, 2005), which states that innovation research must consider a given three-year period to ensure the veracity of the studies.

The football clubs that justify the research are: América Futebol Clube (Belo-Horizonte-MG), Associação Atlética Ponte Preta (Campinas-SP), Associação Chapecoense de Futebol (Chapecó-SC), Atlético Clube Goianiense (Goiânia-GO), Avaí Futebol Clube (Florianópolis-SC), Botafogo de Futebol e Regatas (Rio de Janeiro-RJ), Club de Regatas Vasco da Gama (Rio de Janeiro-RJ), Clube Atlético Mineiro (Belo Horizonte-MG), Clube Atlético Paranaense (Curitiba-PR), Clube de Regatas do Flamengo (Rio de Janeiro -RJ), Coritiba Foot Ball Club (Curitiba-PR), Cruzeiro Esporte Clube (Belo Horizonte-MG), Esporte Clube Bahia (Salvador-BA), Esporte Clube Vitória (Salvador-BA), Figueirense Futebol Clube (Florianópolis-SC), Fluminense Football Club (Rio de Janeiro -RJ), Goiás Esporte Clube (Goiânia-GO), Grêmio Football Porto Alegrense (Porto Alegre-RS), Joinville Esporte Clube (Joinville-SC), Santa Cruz Futebol Clube (Recife-PE), Santos Futebol Clube (Santos-SP), São Paulo Futebol Clube (São Paulo-SP), Sociedade Esportiva Palmeiras (São Paulo-SP), Sport Club Corinthians Paulista (São Paulo-SP), Sport Club do Recife (Recife-PE) and Sport Club Internacional (Porto Alegre-RS).

Football clubs are intangible-intensive entities (Galvão & Miranda, 2016), and intangibles are sources for implementing innovative potential (Bartoloni, 2013; O'Brien, 2003; Teh *et al.*, 2008), and innovation is analyzed through indicators such as brand registration (TDM) and representativeness of intangible assets (RIA). Brand information is taken from the website of the National Institute of Intellectual Property (INPI) and considers the natural logarithm of the number of brand registrations made in each year of the study period (Kayo, Teh, & Basso, 2006; Teh *et al.*, 2008). Information on Intangible Assets Representativeness (RIA) was obtained indirectly from the financial statements of football clubs, specifically the balance sheet, which is available on each club's website, taking into account the ratio between the values of intangible assets and assets total (Leite & Pinheiro, 2013; Maia & Vasconcelos, 2016).

This research used as proxies: the natural logarithm of gross sales revenue obtained in the clubs' income statements each year to measure financial performance (FP) (Galvão & Dornelas, 2017; Leite & Pinheiro, 2013; Rohde & Breuer, 2016). Economic performance (EP) was obtained directly from the financial statements (Income Statement and Balance Sheet), as a result of the ratio of profit to equity (Brito, Brito, & Morganti 2009; Santos *et al.*, 2016). Thus, sports performance (SP) was measured using the information contained in the CBF rankings available on the Confederation website for the years 2015 to 2017, in which the score of each team to create the respective variable was logarithmized.

The following control variables were also included: club age (AGE), represented by the year of institution of the company until each year surveyed (Mcdougall & Oviatt, 2000; Shearmur, Doloreux, & Laperrière, 2015); Size (SIZE) represented by the asset value logarithm (Boehe, Larentis, Toni, & Mattia, 2011; Shearmur *et al.*, 2015); and the dummies referring to the years of analysis. Data referring to the control variables were taken from club websites on their financial statements.

Initially, for the first specific objective, the characteristics of the sample clubs were outlined by presenting the innovative scenario based on the number of brands and the composition of their assets during the period analyzed and then listing the most innovative clubs.

Then organizations for innovation, performance and control were created according to their distribution quartiles, creating four categories: low, medium-low, medium-high and high (Chart 1). Table 1 is the categorization for the variables mentioned above.

Chart 1 – Categorization of control variables.

Quart	Interval	Categorization
1°	minimum value at 24° percentile	Low (L)
2°	25° percentile to 49° percentile	Medium-low (ML)
3°	50° percentile to 74° percentile	Medium-high (MH)
4°	75° percentile to maximum value	High (H)

Source: made by the authors.

Table 1 - Categorization of study variables.

Quart	Categorization	RIA	FP	EP	SP	SIZE	AGE
1°	Low (L)	To 0,07 37	To – 17,8979	To 0,2195	To 8,8771	To 18,1609	To 89
2°	Medium-low (ML)	Fro 0,07 38 to 0,15 11	From 17,8980 to 18,5646 0,0055	From- 0,2196 to 0,0055	From 8,8772 to 9,2031	From 18,1610 to 19,1935	From 90 to 104
3°	Medium-high (MH)	Fro 0,15 12 to 0,22 37	From 18,5647 to 19,4750 0,2814	From 0,0056 to 0,2814	From 9,2032 to 9,4823	From 19,1936 to 20,0334	From 105 to 112
4°	High (H)	Fro 0,22 38	From 19,4751	From 0,2815	From 9,4824	From 20,0335	From 113

Subtitles: RIA - Representativeness of the intangible asset. FP - Financial performance. EP – Economic performance. SP – Sport performance. SIZE – Size. AGE – Age.

Source: Research data.

Then, Multiple Correspondence Analysis was proceeded – MCA, it is a technique that shows associations between a set of non-metric variables in a perceptual map and thus allows a visual examination of any pattern or data structure (Fávero, Belfiore, Silva, & Chan, 2009). Therefore, the technique was used to examine the association between constructs regarding innovation, performance, size and age.

In order to meet the general objective of the research, a linear regression was performed for financial, economic and sports performance, according to the following econometric models:

Equation (1): $FP_i =$

Table 3 - Ranking of Serie A Football Clubs for Brand Registration.

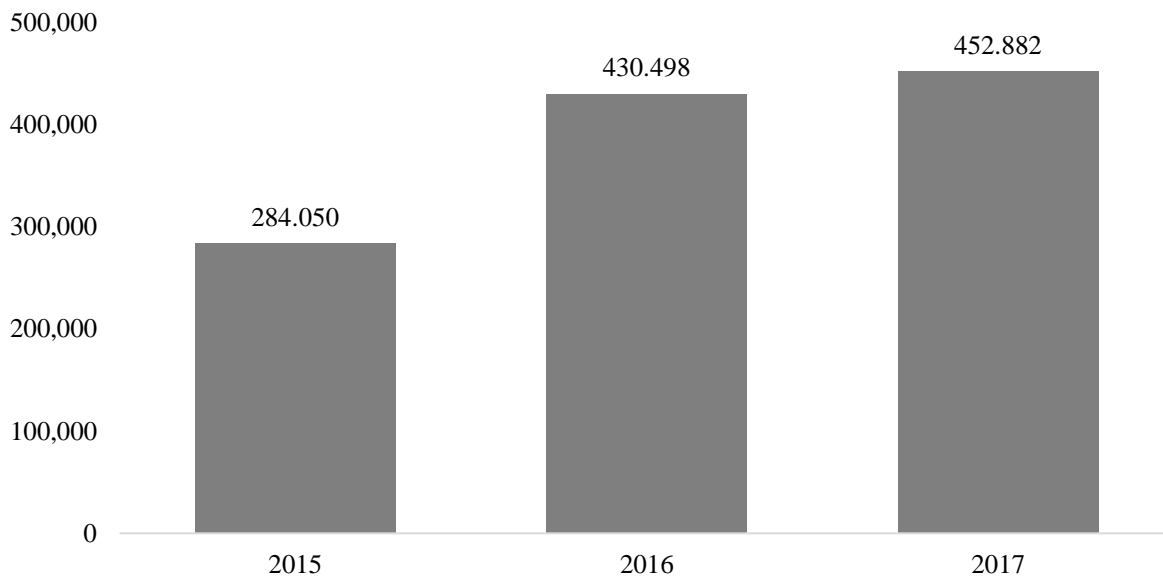
Club	2015	2016	2017	Total	Representativeness
Clube de Regatas do Flamengo	4	16	1	21	15,22%
Clube Atlético Mineiro	1	15	0	16	11,59%
Sociedade Esportiva Palmeiras	0	16	0	16	11,59%
Grêmio Football Porto					
Alegrense	9	4	0	13	9,42%
Sport Club Corinthians Paulista	6	6	0	12	8,70%
Cruzeiro Esporte Clube	8	2	0	10	7,25%
São Paulo Futebol Clube	6	2	0	8	5,80%
Clube de Regatas Vasco da					
Gama	0	7	0	7	5,07%
Fluminense Football Club	2	4	0	6	4,35%
Clube Atlético Paranaense	1	4	0	5	3,62%
Associação Atlética Ponte Preta	5	0	0	5	3,62%
Botafogo de Futebol e Regatas	1	3	0	4	2,90%
Santos Futebol Clube	0	4	0	4	2,90%
Sport Club do Recife	0	4	0	4	2,90%
América Futebol Clube	0	3	0	3	2,17%
Esporte Clube Bahia	0	2	0	2	1,45%
Associação Chapecoense de					
Futebol	0	0	1	1	0,72%
Sport Club Internacional	1	0	0	1	0,72%
Atlético Clube Goianiense					
Avaí Futebol Clube					
Coritiba Foot Ball Club					
Figueirense Futebol Clube					
Goiás Esporte Clube	0	0	0	0	0,00%
Joinville Esporte Clube					
Santa Cruz Futebol Clube					
Esporte Clube Vitória					
Total	44	92	2	138	----

Source: Research data.

In Table 3, considering the registration of brands as a variable for innovation the Clube de Regatas Flamengo is considered most innovative because it was responsible for the registration of 15.22% of brands in the period studied. Then, the Clube Atlético Mineiro and Sociedade Esportiva Palmeiras are responsible for the registration of 11.59% of total brands. It is important to mention that the clubs Atlético Clube Goianiense, Avaí Futebol Clube, Coritiba Foot Ball Club, Figueirense Futebol Clube, Goiás Esporte Clube, Joinville Esporte Clube, Santa Cruz Futebol Clube and Esporte Clube Vitória are not considered innovative

because they did not register any brands in the period analyzed. It is important to note that clubs in southeastern Brazil are the ones that register the most brands because of their visibility in the national sports scene. In relation to value of intangibles, there is an evolution relative the value of this asset (Figure 1).

Figure 1 - Evolution of the total values of intangible assets of Brazilian football clubs of series A (in thousands of dollars)



Source: Research data.

The information presented in Figure 1, the values of intangible assets of clubs grew during the time period studied, from US\$ 284,050,000 in 2015 to US\$ 430,498,000 in 2016, representing a growth of 14.55%. From 2016 to 2017, there was an increase in intangible assets by 23.10%. Thus, it is argued that the sample clubs are increasingly investing in intangible assets and so their innovative potential has been increasing. Complementing Figure 1, Table 4 presents a ranking of football clubs, into account the registration of values as intangible assets.

Table 4 - Ranking of Brazilian football clubs, series A, as Intangible Assets (in dollars).

Club	2015	2016	2017	Total
Sociedade Esportiva Palmeiras	29,261,163	52,133,231	88,824,699	170,219,092
Sport Club Corinthians Paulista	34,442,093	50,894,769	46,557,831	131,894,694
São Paulo Futebol Clube	37,408,605	45,798,769	39,822,590	123,029,964
Cruzeiro Esporte Clube	23,891,550	45,364,158	38,654,497	107,910,204
Sport Club Internacional	19,141,034	30,637,144	26,206,229	75,984,407
Associação Atlética Ponte Preta	19,267,341	26,297,253	24,752,217	70,316,810
Santos Futebol Clube	18,754,419	24,985,538	26,522,590	70,262,547
Grêmio Football Porto Alegre	15,674,651	25,016,923	21,948,494	62,640,068
Clube de Regatas do Flamengo	10,921,628	15,236,308	28,171,386	54,329,321
Clube de Regatas Vasco da Gama	18,469,302	20,462,769	11,906,928	50,838,999
Fluminense Football Club	19,454,651	15,172,923	10,670,783	45,298,357
Clube Atlético Mineiro	9,294,399	18,271,102	14,378,367	41,943,868
Sport Club do Recife	2,421,962	11,877,166	23,496,889	37,796,017
Coritiba Foot Ball Club	6,954,505	10,458,284	9,311,979	26,724,767
Esporte Clube Bahia	3,487,209	9,232,000	7,638,855	20,358,065
Clube Atlético Paranaense	4,372,740	6,215,967	7,844,954	18,433,661
Esporte Clube Vitória	3,834,221	6,225,220	7,486,341	17,545,782
Botafogo de Futebol e Regatas	1,435,581	5,360,923	5,683,434	12,479,938
Figueirense Futebol Clube	1,866,674	2,690,271	2,303,258	6,860,203
Associação Chapecoense de Futebol	329,660	1,231,761	3,472,970	5,034,391
Goiás Esporte Clube	1,109,763	1,620,455	1,663,870	4,394,088
Santa Cruz Futebol Clube	415,830	1,704,203	1,444,661	3,564,694
Avaí Futebol Clube	570,523	1,021,576	1,798,880	3,390,979
América Futebol Clube	0	1,905,194	1,436,036	3,341,230
Joinville Esporte Clube	465,632	682,470	453,345	1,601,446
Atlético Clube Goianiense	805,638	2,492	430,402	1,238,532
Total	284,050,773	430,498,870	452,882,482	1,167,432,126

Source: Research data.

The information in Table 4 shows that Sociedade Esportiva Palmeiras was the club with the highest value of intangible assets in the period analyzed and its investments grew year by year. Sport Club Corinthians Paulista was in second place and only from 2015 to 2016 their intangible increased, decreasing the following year in 2017. Two teams were the best in this period, Palmeiras with one title and Corinthians with two titles, both were the clubs that won the last three editions of the national tournament, the Brazilian Football Championship, years 2015, 2016 and 2017. The clubs that were in the last places of the ranking

or increased from series B to Series A and / or downgraded from series A to Series B, in the period analyzed. With the results, it is concluded that the investment in intangible assets may be determinant for the conquest of national titles or the downgrade to the second division.

After analyzing Tables 3 and 4, it was noted that Sociedade Esportiva Palmeiras and Sport Club Corinthians Paulista are the most innovative clubs taking into consideration the registration of brands and the value of intangible assets, as both are present in the first five places in the rankings.

In Figure 2, through a perceptual map, it was concluded that there is an association between the variables representing innovation and club characteristics, such as size and age. It is highlighted the variables RIA, Age and Size that were categorized according to quartiles, as follows: L - low level; ML - medium-low level; MH - medium-high level; H - high level.

Figure 2 - Perceptual Map: Club Innovation and Characteristics.



Subtitle: TDM registered (Innov) or not (NoInnov) marks in the period analyzed; RIA: representativeness of intangible assets; AGE: age of clubs in the years 2015 to 2017; SIZE: company size. L - low level; ML - medium-low level; MH - medium-high level; H - high level.

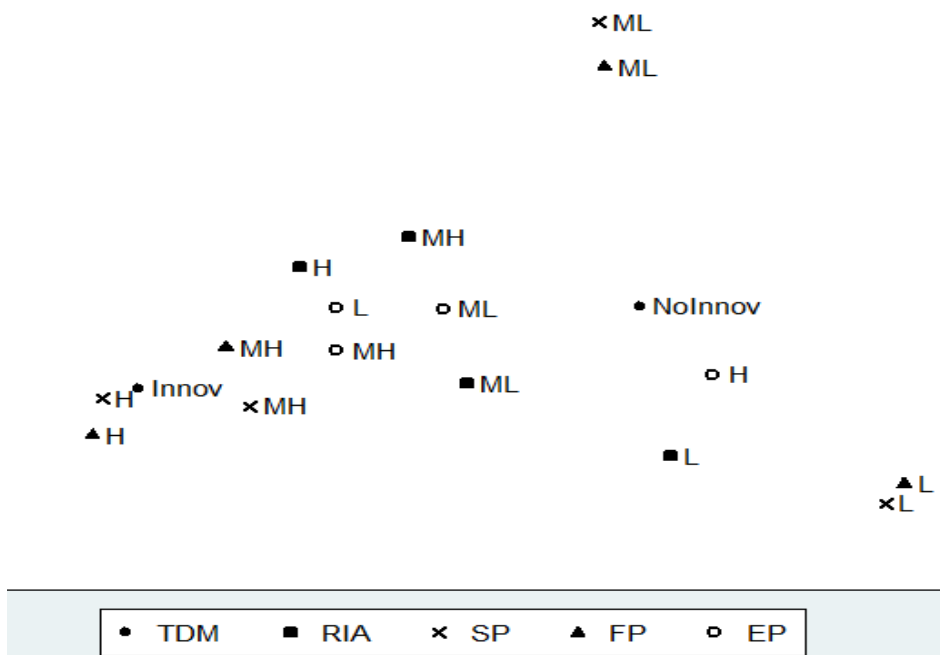
Source: Research data.

In Figure 2 there is an association between non-brand registration and representativeness of intangible assets (RIA) in the medium-low category. There is also an association between medium-high RIA and size and medium-low age, and there is an association between clubs with high RIA, high age and medium-high size. In the analyzed period, intangible assets are a means for the club to achieve its innovative potential, and the representation of intangible assets (RIA) is an important factor in brand registration, as the lower RIA, the greater the probability that the club will not register. Another inference is that clubs of high age and size, those of smaller size and age are also likely to have a higher RIA, since early on a club prefers to

make investments in intangible assets (innovation) as a way to keep financial, economic and competitive sportive. Through these associations, it is assumed that most of a club's assets are intangible assets, and clubs with higher (medium-high and high) RIA are associated with medium-low and medium-high size levels.

In sequence in Figure 3 contains a perceptual map, an association between innovation and performance.

Figure 3 - Perceptual map innovation and performance of Brazilian football clubs of series A.



Subtitle: TDM registered (Innov) or not (Noinnov) marks in the period analyzed; RIA: representativeness of intangible assets; SP: sport performance; FP: financial performance; EP: economic performance. L - low level; ML - medium-low level; MH - medium-high level; H - high level.

Source: Research data.

From Figure 3 the clubs with sporting and financial performance categorized as high level are associated with those who have registered brands. Clubs that have not registered brands are associated with high-level economic performance. Thus, the innovation represented by the registration of brands contributes to the clubs to have a high performance in revenues, and it is assumed as a consequence that this financial return helps the clubs in the expansion of investments and / or to hire players, coaches and better quality structure aimed at winning championships or higher final score in championships organized by the Brazilian Football Confederation (CBF). This investment also contributes to improving its ranking in this entity. In turn, clubs that did not register brands in the period under review have high economic performance, ie the high level of profitability may be related to the lack of resources invested by the club to register their brands.

In relation to the representativeness of intangible assets (RIA) we have: clubs with high RIA associated with low economic performance and medium-high financial; Medium-low-RIA clubs are associated with

medium-high economic performance. Thus, investing resources in intangible assets (innovation), clubs reduce their economic performance, as there is an inverse association between these variables (Figure 3) in contrast to the study by Dimitropoulos and Koumanakos (2015) that used data regarding intellectual capital and performance measured by the economic performance of European clubs to verify such a relationship. This figure also demonstrates that there are positive associations between financial performance and sports performance, previously explained about the association between performances.

As a general research objective, initially the descriptive statistics of the study variables were presented (Table 5).

Table 5 - Descriptive statistics of variables.

Variables	Obs.	Mean	Standard deviation	Minimum	Maximum	Coefficient of variation
TDM	78	0,5594	0,8487	0,0000	2,8332	151,71%
RIA	78	0,1673	0,1217	0,0000	0,5755	72,73%
SP	78	9,1621	0,3498	8,3687	9,6348	3,81%
FP	78	18,5207	1,0560	15,5242	20,2905	5,70%
EP	78	-0,2928	3,1606	-26,8839	2,9321	-1.079,35%
AGE	78	97,3846	20,3733	39,0000	122,0000	20,92%
SIZE	78	19,0603	1,2722	15,9383	21,0246	6,67%

Subtitle: TDM: brand registration; RIA: representativeness of intangible assets; SP: sport performance; FP: financial performance; EP: economic performance; AGE: club age; SIZE: company size.

Source: research data.

The information in Table 5 indicates that the age variable has the highest average because of some clubs that have advanced ages, such as the Clube de Regatas Vasco da Gama and Clube de Regatas Flamengo, for example, which in 2017 were 119 and 122 years old respectively. Other clubs as Joinville Esporte Clube and Associação Chapecoense de Futebol may be considered new or underage because in 2017 were 41 and 44 years old respectively. About pattern deviation for the age variable remains the highest value. This allows us to infer that data distribution has values with greater dispersion than the average. The various representatives of innovation, brands (TDM), and the representativeness of intangible assets (RIA) show greater heterogeneity, since the coefficients of variation are 151.71% and 72.73%, but this changes due to the variability of the sample clubs.

Table 6 shows the correlations between the study variables. In advance, the Spearman correlation was chosen because, according to the Kolmogorov-Smirnov test, the variables do not present a normal distribution.

Table 6 - Spearman Correlation.

	TDM	RIA	AGE	SIZE	SP	FP	EP
TDM	1						
RIA	0,0928	1					
AGE	0,2515**	0,2003*	1				
SIZE	0,4765***	0,0047	0,4559***	1			
SP	0,4558***	0,3534***	0,3854***	0,7579***	1		
FP	0,4926***	0,274**	0,383***	0,8065***	0,8494***	1	
EP	-0,2164*	-0,1095	-0,11	-0,1053	-0,172	-0,1804	1

Subtitle: TDM: brand registration; RIA: representativeness of intangible assets; AGE: club age; SIZE: company size; SP: sport performance; FP: financial performance; EP: economic performance.

(*) Statistical significance at the 10% level; (**) Statistical significance at the 5% level;

(***) Statistical significance at the 1% level.

Source. Research data.

The data presented in Table 6 shows a significant and positive correlation at level 1% between brand registration (TDM) and financial and sports performance, and a significant and negative relationship at level 10% for the variable innovation and economic performance. Therefore, another variable to assess study innovation (RIA) is related to the 1% level of sports performance, the 10% level of financial performance. There is also a positive correlation (1%) between financial and sports performance. The relationship between innovation and performance confirms the studies of Galvão and Dornellas (2017) and contrasts with the results of Cunha *et al.* (2017), who found no relationship between these variables in their research with Brazilian football clubs. These results suggest that clubs that register their brands, and in investment, value their employees (players, coaching staff) more, add value, excel in sportsmanship and achieve better financial returns, assuming that innovation can be a potential source of competitive advantage that results in superior performance (Dimitropoulos and Koumanakos, 2015). The existence of a negative relation between innovation and economic performance may be linked to the long-term return on investments made with innovation, as there is an incipient registration of brands by clubs in the analyzed period.

There is a significant and positive relationship between age and the innovation variables (TDM and RAI) showing the club's ability to innovate over time. There is a positive correlation between the size variable (SIZE) and brands, understanding that the more the club invests in assets, the more probability it is to register its brands.

Then, the multiple linear regression analysis was performed according to the econometric models developed to test the research hypothesis. The models were processed with the robust application of White, in order to test the homoscedasticity of variation of the residues (Fávero *et al.*, 2009). No problem was found according to Variance Inflation Factor (VIF) statistics. The representative dummy variable for the year 2016 (D2016) was excluded to eliminate multicollinearity. Table 7 is showed the results of multiple linear regressions.

Table 7 - Multiple linear regressions for variance homoscedasticity test from data obtained from Serie A Football Clubs.

Variables	Eq. 1 Dependent variation:			Eq. 2 Dependent variation:			Eq. 3 Dependent variation:		
	FP			EP			SP		
	Coef.	t	Sig.	Coef.	t	Sig.	Coef.	t	Sig.
TDM	0,173	1,92	0,059*	0,039	0,13	0,901	0,053	1,97	0,053*
RIA	2,323	4,74	0,000***	-2,957	-0,9	0,373	0,986	5,58	0,000***
AGE	-0,005	-1,15	0,253	0,019	0,88	0,382	-0,001	-1,27	0,209
SIZE	0,651	9,38	0,000***	-0,478	-0,98	0,331	0,210	10,65	0,000***
D2015	-0,175	-1,09	0,281	1,187	1,1	0,274	0,062	1,17	0,246
D2017	0,014	0,08	0,937	1,766	1,34	0,184	0,035	0,65	0,519
_cons	6,168	5,26	0,000***	6,446	0,98	0,333	5,081	16,21	0,000***
N	78			78			78		
F	34,44***			1,2			50,53***		
<i>p-value</i>	0,000			0,315			0,000***		
R ²	0,735			0,084			0,727		
VIF	1,610			1,610			1,610		
Shapiro-Francia	0,031**			0,000			0,551*		

Subtitle: TDM: brand registration; RIA: representativeness of intangible assets; AGE: club age; SIZE: company size; SP: sport performance; FP: financial performance; EP: economic performance.

(*) Statistical significance at the 10% level; (**) Statistical significance at the 5% level;

(***) Statistical significance at the 1% level.

Source: Research data.

As observed in Table 7, only models 1 and 3 were tested presented significant ($P < 0.01$), with explanatory power (R^2) of 73.5% and 72.7% respectively. The normality of the residues was tested by the Shapiro-Francia test ($P < 0.05$) for equation 1 and for equation 3 ($P < 0.10$). However, no significance was found for equation 2. Thus, nothing can be concluded about the influence of innovation on the economic performance of clubs.

About the variables, brand registration (TDM), and representativeness of intangible assets (RIA), as proxies for measuring innovation, it is inferred that there is a significant and positive influence of innovation on financial and sports performance, and that innovation contributes to increase performance in Brazilian football clubs, according to studies by Rohde and Breuer (2016) with European football clubs. Thus, it is understood that innovation is a potential competitive source, as it results in increased performance.

Another significant 1% variable that contributes to increased performance is club size (SIZE). This variable corresponds to the natural logarithm of the asset, it is clear that investing in assets is a factor that increases the financial and sports potential of clubs and, in addition, it is noteworthy that among these assets are intangibles.

According to the results presented, it eliminates the study hypothesis that innovation influences the performance of Brazilian football clubs, since the influence of innovation on performance was not fully verified, since nothing can be concluded about economic performance.

5 Conclusions

The present study has considered that innovation is measured by the registration of brands and the representativeness of intangible assets influencing the financial and sports performance of Brazilian football clubs. In both, these proxies were adopted to fill blanks on the themes studied, serving to deepen their interrelationship and provide answers and possibilities for more concrete decisions by managers.

Initially, the profile of innovation in Brazilian football clubs was based on the number of brands registered in the period analyzed. Thus, 138 brands were registered, and 2016 was the most favorable year with 66.67% of brands. The Sociedade Esportiva Palmeiras registered more brands and won the Brazilian Championship in 2016. The Clube de Regatas Flamengo is considered the most innovative with 15.22% of the brand registrations in the analyzed period. In the study period from 2015 to 2017, the variation in intangible assets increased by 23.10%. The Sociedade Esportiva Palmeiras presented the highest value in intangible assets in the period analyzed, and won the Brazil Cup in 2015 and the Brazilian Championship in 2016.

It is noticed that there is an association between the representativeness of intangible assets (RIA) and non-registration of brands. Notwithstanding this result, intangible assets (RIA) are the means for the club to achieve its innovative potential, as they are the relevant factors in brand registration, on the other words the lower the representativeness of intangible assets (RIA), the greater the possibility that the club will not register brands. It is also noticed that most assets are intangibles (RIA), because clubs with higher (medium-high and high) intangible assets are associated with medium-low and medium-high size levels.

In addition, football clubs with high sports and financial performance are associated with those other brand clubs. Clubs that have registered brands are associated with high-level economic performance. With this result, innovation, when represented by brand registration, helps clubs increase their financial performance and consequently invest and/or hire players, technical team and quality structure in order to win championships or have a good final score in championships organized by the Brazilian Football Confederation (CBF), improving their ranking qualification. However, clubs that have not registered their brands during the reporting period have good economic performance and this has to do with applying funds to the club to register their brands. It is also conjectured that clubs that invest in intangible assets (innovation) reduce their economic performance because of the inverse association.

The variables, brand registration and representativeness of intangible assets as proxies for measuring innovation indicate that there is significant and positive influence of innovation on financial and sports performance, on other words, the innovation contributes to the increase of these performances. It is unclear about the influence of innovation on the economic performance of clubs, and this resulted in the rejection of the research hypothesis, as such relationship was not fully verified.

This research contributed in theory and practice, since academic research involving innovation and performance, specifically in Brazilian football clubs, is uncertain. The study is limited to only three years,

according to the Oslo Manual (OCDE 2005) and the incipient preoccupation with innovation about brand registrations. In future, research is important to expand the sample analyzed and also consider other indicators of innovation, economic, financial and sports. There is still a possibility in future research to incorporate other means to add further analysis, such as measuring the efficiency of innovation in club performance and verifying the relationship of innovation with the internationalization of clubs, as well as examining the relationship between sponsorship, innovation and performance.

The results of this study are expected to contribute both to the incipient literature on the issues in the context of football clubs, as well as to highlight and assist managers as to the importance of investments in innovation as a propellant of performance and as a potential source of competitive advantage.

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