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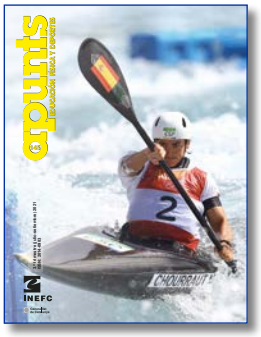

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Competitive Balance in Male European Rink Hockey Leagues

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Maialen Chourraut (ESP) competing in Rio de Janeiro Olympic Games (2016), Whitewater Stadium. Women's Kayak (K1) Semi-final. REUTERS / Ivan Alvarado

Abstract

The interest in competitive balance in different team sports has increased over time. However, hitherto, scant research has been conducted into minority sports, such as rink hockey. With these circumstances in mind, the primary objective of this study was to quantify the competitive balance in different European professional rink hockey leagues (Spain, Portugal, Italy and France) and to compare the results. The sample was comprised of 7,394 rink hockey matches (2,284 in the Spanish league, 1,996 in the Portuguese league, 1,794 in the Italian league and 1,320 in the French league) played between the 2009-2010 and 2018-2019 seasons. To determine competitive balance, the Accumulated Points Difference (APD) was calculated and a One Way ANOVA followed by the Tukey Post Hoc multiple comparison test was used. The results showed that the French league is the most balanced championship (68.94% ± 6.39), followed by the Spanish league (71.93% ± 10.77). The Portuguese (75.31% ± 5.48) and Italian leagues (75.16% ± 8.55) presented higher APD values, indicating that some teams enjoyed a more significant advantage. The analysis of competitive balance could provide a better understanding of this effect in rink hockey. This metric can help coaches and practitioners to tailor training programs better and also help governing bodies to understand competitive parity in every European league. In this regard, in some cases, changes may need to be made to the format of the competition to make it more balanced.

Keywords: competitive advantage, minority sports, outcome uncertainty, performance analysis, rink hockey, team sports.

Introduction

In recent years, the growing interest in sports performance analysis has also led to an increase in the number of studies dealing with match variables in team sports. Rink hockey, also known as roller hockey or quad hockey, is no exception, and in the last few years the number of studies addressing this sport has grown considerably. Thus, home advantage (Arboix-Alió et al., 2020; Arboix-Alió & Aguilera-Castells, 2019), scoring sequence (Arboix-Alió et al., 2019; Arboix-Alió & Aguilera-Castells, 2018), the influence of opponents' offensive play on goalkeeper performance (Sousa et al., 2020), the conditional response according to court dimensions and number of players (Fernández et al., 2020) or individual set-pieces (Arboix-Alió et al., 2021; Trabal, 2016; Trabal et al., 2020) had been studied in specific rink hockey contexts. One of the most relevant factors associated with this outcome is competitive balance (CB), defined as the degree of parity among teams (Gómez-González et al., 2019).

Competitive parity has also become a relevant topic in sports economics. Unlike other contexts, sport, and more particularly professional leagues, requires a certain degree of CB to achieve maximum benefits (Lee et al., 2018). CB reflects both teams' likelihood of winning the competition (García-Unanue et al., 2014). Therefore, the study of CB for each professional league is relevant, because a higher balance usually results in greater fan interest, leading to better attendance and increased television audiences (Soebbing, 2008). This increased interest also generates greater profits for teams (Levin & Bailey, 2012; Levin & Mcdonald, 2009).

CB can be interpreted as the degree of uncertainty as to a team's position at the end of the season. More specifically, Szymanski (2003) distinguishes between three degrees of uncertainty. Firstly, game uncertainty, when both teams have a chance of winning. Secondly, the uncertainty of a specific season, when several teams have the potential to be placed in the top positions or make the playoffs. Finally, the uncertainty of a league or competition, with different teams winning the championship over several years.

Scientific research has used several methods to measure CB, focusing mainly on regular season analysis (García-Unanue et al., 2014). Of these measurements, the Competitive Balance Ratio for perfect competitiveness (Humphreys, 2002), the Gini coefficient (Schmidt, 2001), the concentration ratios of victories for the first five teams (Naghshbandi et al., 2011), the Accumulated Points Difference (Gasparetto & Barajas, 2016) or the Herfindahl-Hirschman Index, used to measure CB in professional sports leagues (Owen et al., 2007), have been used in the studies mentioned above. Furthermore, adapted versions allowing comparisons between leagues with a different number of teams and within leagues with a variable number of teams over time could be considered (Zambom-Ferraresi et al., 2018).

The effect of CB has been studied in many sports competitions in different countries (Kringstad, 2020; Zheng et al., 2019), on the one hand for individual sports such as cycling (Bačik et al., 2019), table tennis (Zheng et al., 2019) or athletics (Mills & Winfree, 2018), and on the other for team sports such as basketball (García-Unanue et al., 2014), ice hockey (Bowman et al., 2018), rugby (Hogan et al., 2013), handball (Hantau et al., 2014), baseball (Soebbing, 2008) or soccer (Naghshbandi et al., 2011; Ramchandani et al., 2018). Nevertheless, to the best of our knowledge, few studies address this topic in rink hockey. Only Arboix-Alió, Buscà, et al. (2019) have analysed CB between male and female teams in the Spanish and Portuguese leagues. Thus, this study's primary objective was to analyse the CB of four top male European rink hockey leagues (Spain, Portugal, Italy and France) using the Accumulated Point Difference and to compare each league's results.

Methodology

Materials and methods

Sample

This study's dataset consisted of ten years of box-scores (from the 2009-2010 season to the 2018-2019 season) collected through the www.hockeypista.it open-access website. Match data were double-checked and validated using the www.okcat.cat independent website. 7,394 rink hockey matches were analysed to carry out the study: OK Liga (Spanish league; 2,284 matches), Serie A1 (Italian league; 1,794 matches), Divisao (Portuguese league; 1,996 matches) and N1 Elite (French league; 1,320 matches). These rink hockey leagues have a similar fixtures schedule; all the teams play against each other once at home and once away during the season. All matches involve a home and away team. Only regular-season matches were included in the sample. The scoring system of all the rink hockey leagues analysed was: 3 points for a win, 1 point for a draw and 0 points for a loss.

Variables

The Accumulated Point Difference (APD) was used as an indicator of CB. The APD calculates the sum of the point differential among participants (Gasparetto & Barajas, 2016). These differences are computed by subtracting the points obtained by the runner-up from the champion's total points. This operation is repeated successively until the point difference between the second-last team and last teams is calculated.

Table 1
Descriptive analysis of APD values for each league and season. Total values are expressed as Mean ± SD.

Season	Spain APD (%)	Portugal APD (%)	Italy APD (%)	France APD (%)
2009-2010	70.00	72.22	76.92	74.24
2010-2011	57.69	71.11	82.05	74.24
2011-2012	70.51	79.76	73.08	74.24
2012-2013	70.00	77.78	88.46	57.58
2013-2014	91.11	64.44	83.33	66.67
2014-2015	85.56	83.33	76.92	64.64
2015-2016	63.33	75.64	57.69	62.12
2016-2017	58.89	75,00	70.83	71.21
2017-2018	75.56	80.77	71.79	77.27
2018-2019	76.67	73.08	70.51	68.18
TOTAL	71.93 ± 10.77	75.31 ± 5.48	75.16 ± 8.55	68.94 ± 6.39

Note: APD = Accumulated Point Difference.

Thus, the maximum imbalance would be calculated as follows:

$$\text{Imbalance}_{max} = 6 * (N-1)$$

Therefore, the formula created from the APD method is presented below:

$$\text{APD} = \left(\frac{\sum^{N} i=1 \, (\text{TP}_{i=1})}{\text{Imbalance}_{max}} \right) * 100$$

Where N is the number of participating teams and TP is the total points of each club at the end of the tournament. In addition, the Average Position (AP) of the teams winning the championship in each league over the ten seasons studied was calculated.

Statistical analysis

The Shapiro-Wilk test was used to confirm that the data were normally distributed, thus permitting parametric tests. Descriptive statistics were performed to calculate mean ± SD and frequencies. Group comparison was performed using a two-way (league and APD) analysis of variance (ANOVA), followed by Tukey's Post Hoc multiple comparison test. Statistical analyses were performed using SPSS (Version 20 for Mac; SPSS Inc., Chicago, IL, USA) and statistical significance was set at $p < .05$.

Ethical considerations

Since the study was performed in an official competition open to the public, according to the American Psychological Association's ethical requirements (2002) the athletes' informed consent was not required.

Results

Table 1 presents the descriptive statistics and percentages of the APD from all the matches in the different competitions between the 2009-2010 and 2018-2019 seasons. The competition with the lowest APD value, and consequently the most balanced one, was the French league (68.94% ± 6.39). Although a significant main effect of the league on the APD index was not found [$F_{(3,32)} = 1.412$ $p = .255$], and this difference was not statistically significant ($p > .05$), the difference was almost 7% for the Portuguese league (75.31% ± 5.48) and the Italian league (75.16% ± 8.55). The Spanish league had a closer APD value when compared to the aforementioned competitions with 71.93% ± 10.77 (Figure 1).

The evolution in the APD value over the ten seasons analysed fluctuated less in the Portuguese and French leagues (Figure 2). On the contrary, the Spanish league presents greater variability in some seasons, with an APD value of 91.11%, compared to 57.69% in others.

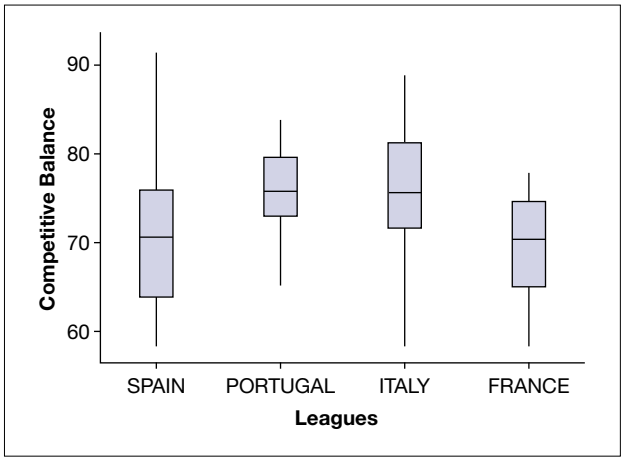

Figure 1
Comparison of Accumulated Point Difference values by league.

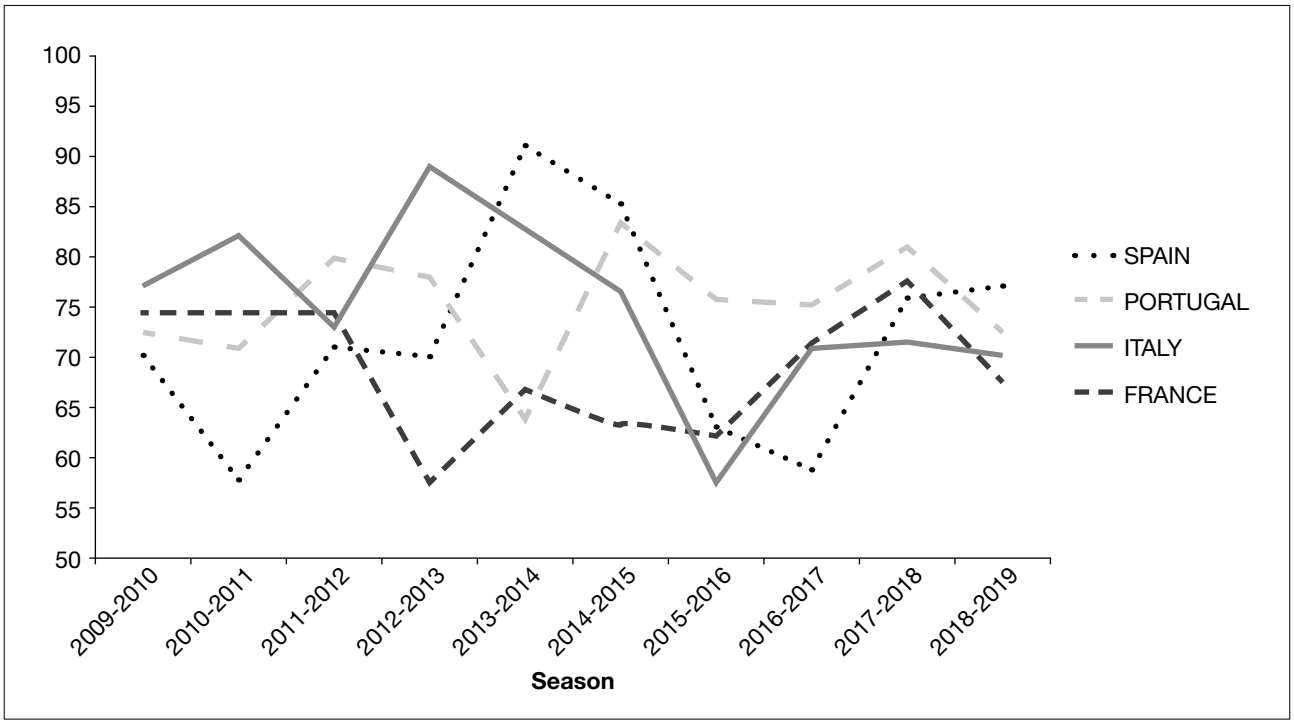

Figure 2
Evolution of Accumulated Point Difference values over time.

Table 2
Winning teams, number of championships and average position from the 2009-2010 to the 2018-2019 seasons.

Spain			Portugal			Italy			France		
Club	C	AP	Club	C	AP	Club	C	AP	Club	C	AP
FC Barcelona	8	1.3	FC Porto	5	1.7	Forte Dei Marmi	4	4	HC Quévert	5	1.7
HC Liceo	1	2.1	SL Benfica	3	2.2	Amatori Lodi	3	3.6	La Vendéenne RH	2	3.33
Reus Deportiu	1	3.4	Sporting CP	1	5.42	Hockey Valdagno 1938	2	4.2	US Coutras	2	4.2
			AD Valongo	1	5.7	Viareggio	1	3.5	SCRA Saint-Omer	1	2.8

Note: C = Championships won; AP = Average Position.

Table 2 shows the clubs that win the national championship and their average position over the ten seasons analysed. It points to the dominance of some clubs in their respective national leagues. Teams with an average value near 1 or 2 were always close to the leading top positions, even if they did not win the championship in every competitive season.

Three clubs won the championship at least twice in the course of the ten seasons analysed in the French and Italian leagues. While, in the Portuguese league, FC Porto and SL Benfica won the championship two or more times (five and three, respectively), whereas FC Barcelona won eight championships in the Spanish league.

Discussion

This study's primary objective was to analyse the CB of several male European professional rink hockey leagues. The results showed that the French league achieved a lower APD value and that consequently it may be considered the most balanced competition.

To the best of our knowledge, this is the first comparative study about CB in European rink hockey leagues; very little information on the matter was found in the literature for the purpose of comparison with these findings. However, a comparison of these findings with those of Gasparetto and Barajas (2016) on APD in professional football leagues (between 2006-2007 and 2013-2014 seasons) yields certain

differences between these sports. First and foremost, the APD values were lower in all the football leagues analysed than in the rink hockey leagues. The APD values in the Spanish (55.59%), French (47.7%), Italian (54.28%) and Portuguese (58.89%) professional football championships presented a higher competitive balance than professional rink hockey. One possible explanation for this might be that rink hockey is a less-intensively played sport and has fewer economic resources than football. For this reason, the different budgets of the teams competing in the same league would make for greater heterogeneity, with professional and semi-professional athletes playing in the same competitions.

With regard to the evolution of CB values over time, it should be noted that the French league seems to fluctuate less, whereas the Spanish, Portuguese and Italian leagues present greater variability. The APD value ranges from 77.27% to 57.58% in the French league, whereas in the Spanish, Portuguese and Italian leagues they range from 91.11% to 57.69%, from 83.33% to 64.44% and from 88.45% to 57.69%, respectively.

As for the clubs that won a national championship in the course of these ten seasons, variability in the Spanish and Portuguese leagues is lower. The supremacy of FC Barcelona in the Spanish league is virtually absolute, as it won eight of the ten leagues analysed. Apart from FC Barcelona (HC Liceo and Reus Deportiu, with 2.1 and 4.4 AP, respectively), the AP of teams that have won a championship showed that the same teams consistently occupy the leading positions. Although this supremacy is not as evident in the Portuguese league as in the Spanish league, there is also a similar trend, and FC Porto and SL Benfica are vastly superior in terms of number of championships won (five and three, respectively) and in AP (1.7 and 2.2). These clubs' patent superiority over the other teams could be attributed to financial reasons, as they belong to football clubs. This phenomenon, called the "drag effect" (Zambom-Ferraresi et al., 2018), affords some rink hockey teams a major advantage over others that do not belong to prominent professional structures. These other teams do not benefit from state-of-the-art facilities or well-paid staff. Another aspect to be considered is the tradition and history of these clubs, in which football was usually the founding sport. Rink hockey clubs with a long-standing tradition enjoy greater support from institutions and sport governing bodies. Finally, the crowd effect must also be considered, as these teams have many supporters. Indeed, previous football research reported that match attendance can significantly determine both dynamics and outcomes (Sors et al., 2020). All of these facts could explain why the same teams have won several championships in the last ten seasons in the Spanish and Portuguese leagues.

This research has certain limitations that must be acknowledged and be addressed in further research. Firstly, it only used the APD method to calculate CB. Secondly, further research could study CB in other rink hockey competitive contexts, such as in different divisions (1st Division, 2nd Division) or in different competitions (Champions League, WS Europe Cup). Expanding the study with more seasons and an analysis of CB at match, season and competition level and including spectator opinions, could be a starting point for adding greater weight to these conclusions. Additionally, identifying the key factors that define success in one sports league rather than others may help to transcend the traditional competitive balance indicators.

Conclusions

Our results identified CB values in four main European rink hockey leagues. According to these findings, the French league presents the lowest APD value and is consequently the most balanced competition in the sample. To the best of our knowledge, this is the first study to compare CB among different European rink hockey leagues. No previous studies have performed this comparison for an extensive set of seasons to obtain sound results. Consequently, this research contributes new knowledge that improves our understanding of the CB effect in general and in rink hockey in particular. This research is therefore expected to contribute to the theoretical and methodological development of the topic.

The analysis of the effect of CB in professional rink hockey leagues may be of interest to Rink Hockey Federations and associations. Quantitative data about CB in each league can help decision-makers to make changes to promote more balanced championships (i.e. establish a wage cap, change the competition format, including a playoff system or a final four instead of a regular league) and to increase attendance figures.

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