

Crystal market: a way to study knowledge-based dynamic capabilities

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Abstract

Purpose – In this work, the authors address a gap in the literature on the contribution of dynamic capabilities and internal contingencies to performance in a highly competitive environment.

Design/methodology/approach – The authors use data from the Premier Football (soccer) League in Portugal over ten years. This league works as a laboratorial setting and enables the authors to identify the influences of the variables in the study.

Findings – The authors find evidence that human capital is decisive to a team's performance. This study's findings question the role of the alignment between the different levels of the organization: strategic, tactical and operational.

Research limitations/implications – With this work, the authors stress the importance (1) of using alternative scenarios in management research and (2) of the way that human and social capitals and managerial cognition and internal contingencies influence the development of knowledge-based dynamic capabilities, especially in highly regulated industries such as sports clubs.

Practical implications – This work provides evidence on the importance of strategic coherence at different structural levels of the organization. Furthermore, it highlights the need to secure the right resources at the right time.

Originality/value – The authors propose a setting to run the study: a crystal market and an original measure of performance that reflect the relative achievement of market potential.

Keywords Dynamic capabilities, Resource-based view, Human capital, Interorganizational relations, Panel data methods

Paper type Research paper

1. Introduction

Because organizations act in a highly volatile, unpredictable context, they continually search for resources to support their strategies. Thus, they face two options. Either they avoid long-term planning (e.g. Gerstner, 2002) that leads to failing to realize their market potential (Săvescu, 2018) through defensive strategies (e.g. Mampaey and Huisman, 2016). Or they anticipate changes and be prepared to move when required (Hällargreen *et al.*, 2018; Smith *et al.*, 2010) to fulfill market potential. They must develop a set of dynamic capabilities (Nayak *et al.*, 2020; Schriber and Löwstedt, 2020; Teece *et al.*, 1997) that allows them to gain advantage

JEL Classification — L21, L22

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over their competitors. Dynamic routines enable organizations to understand market structures, respond to competitors and to foresee market changes (Arndt and Pierce, 2018).

In this study, we explore the relation between dynamic managerial and organizational capabilities and their contributions to organizational performance. Additionally, we study the internal sources of dynamic capabilities through two main strategies: exploitation and exploration. Our goal is to understand how decisions taken over time influence the ability to reach the highest competitive advantage positions or their closeness to their market potential. We contribute to both academia and practitioners with fresh insights into the development of dynamic capabilities. This study challenges the research by proposing an original measure of market performance that reflects the closeness to market potential (CMP). Moreover, the study addresses the effects of human capital, managerial cognition, social capital and internal contingencies on the chosen measure of performance.

According to Arndt and Pierce (2018), the research lacks a theory that relates firm-level competitive advantage to the particular role that management can play in managing assets. The unique opportunities for value creation that emerge from employing idiosyncratic organizational assets are an important source of competitive advantage. However, there is no well-developed market for idiosyncratic assets. In order to address this gap in the literature, we follow Lyon *et al.* (1994) and Elleaesser *et al.* (2013) by using evidence from a series of seasons of the Portuguese Football League. We consider it is a great setting to study the effects of management practices and decision-making regarding the development of dynamic capabilities in a highly competitive environment. The teams' competition to qualify for the championship works as a simulation approach to a market's competitive. This approach might mitigate the criticisms made about the methodological and theoretical aspects of the dynamic capability research (Barreto, 2010; Laaksonen and Peltoniemi, 2018) that focusses on the importance of paying attention to the relations among the analyzed capabilities, the choice of sample and the analyses of the lessons retrieved from the research. We follow various seminal papers in empirical research and support it in a specific longitudinal dataset.

2. Measures and hypothesis development

2.1 Closeness to market potential

The study of dynamic capabilities requires a variable that measures performance. Most measures used in the research are usually financial (e.g. Ahn *et al.*, 2018). Based on our setting, we introduce the CMP. The CMP represents the degree to which a team gets the most possible points over the Premier League season that reflects the efficiency of the team. It measures the distance between real performance and maximum performance (CMP = 0 means that the team reaches the maximum possible points in a season: full potential). The CMP is a measure that captures more than the financial dimension of dynamic capabilities. The CMP reflects the creation of competitive advantage that results from the dynamic capabilities at work. Research should use market-based performance measures and not only accounting performance measures (Barreto, 2010). Researchers should explore and generate measures to identify superior firm performance as a result of dynamic capabilities apart from financial operating ratios (Olivier, 2014). The CMP represents a quantitative measure of global performance that is more comprehensive than improvisation capability (Vera *et al.*, 2016), strategic change (Helfat and Martin, 2015) or organizational agility (Tecece *et al.*, 2016).

A season comprises a set number of matches. In theory, all the teams have the same opportunities and probabilities to win the matches. During the competition, they are challenged to reach the maximum points possible for the season. The schedule is very regular and establishes the rhythm of competition. The weekly matches press teams to adapt their strategy as well as to combine their resources (Nayak *et al.*, 2020) during the matches to overcome unexpected events, such as substitutions due to injuries and changes in the

adversary's play. Teams reveal their strategies given the public nature of the games. Thus, the way to gain advantage over the other teams is to develop dynamic capabilities during the season by following a strategic approach of developing experientially based ways of adapting practices that result from the matches (Nayak *et al.*, 2020). Given that all teams strive to develop their own dynamic capabilities, the achievement of the maximum score is almost impossible for one team. The season's dynamics generate complementarities and cospecialization in the context of that specific ecosystem. Some of the main benefits of participating in an ecosystem are gaining access to knowledge, contributing to common standards and developing capabilities (Kay *et al.*, 2018). According to this rationale, all teams benefit from the learning in the ecosystem, and each team has a point total lower than the maximum. The CMP is a variable that is similar to others that measure the achievement of the organization's tangible and intangible objectives.

2.2 *Dynamic capabilities*

Dynamic capabilities show themselves in best practices that allow organizations to adapt to competitive pressures. To succeed in an ever changing environment, firms develop these capabilities to continuously reshape the ways in which they work by reinforcing their capacity to continually reinvent their resource base (Helfat *et al.*, 2007). Firms use resources to match and even create market changes. Dynamic capabilities are the organizational and strategic routines by which firms achieve new resource configurations when markets evolve (Eisenhardt and Martin, 2000; Winter, 2003). Teams face similar challenges during the season that parallel the demands that firms encounter in the markets. Dynamic capabilities govern the rate of change in the operational capabilities of the organization (Collins, 1994) by shaping best practices and serving as a buffer in the relation between the resources and the changing environment.

Knowledge-based resources nourish dynamic capabilities. The nature of such resources is mainly intangible and dynamic generating an idiosyncratic development through path dependency and causal ambiguity (Curado and Bontis, 2006). The tension between the organizational creation of new knowledge and the use of pre-existing organizational knowledge establishes a dynamic model (Curado and Bontis, 2011). The former regards *exploration* – the development of new routines that result in organizational flexibility and development. It requires risk management, experimentation, innovation and improvisation. The latter addresses *exploitation* – the leverage of current routines and preexisting knowledge that results in organizational refinement (Curado and Bontis, 2006). Ambidextrous organizations can engage in both exploitation and exploration to ensure their current returns and future viability (Levinthal and March, 1993), yet such a balance is not easy to reach (Curado and Bontis, 2011) and requires organizational flexibility (Rotmans, 2019). Dynamic capabilities contribute to ambidexterity, since their deployment may combine exploitative and explorative elements (Randhawa *et al.*, 2020).

The literature highlights the role of the individual decision-maker or manager (Helfat and Peteraf, 2015) in the central aspects of dynamic capabilities: individuals' characteristics, such as human capital, social capital and cognition (Adner and Helfat, 2003; Helfat and Martin, 2015; Teece, 2007). The literature shows that differences in organizational performance (Abell *et al.*, 2008) emerge from differences in effective dynamic managerial capabilities (Helfat and Martin, 2015). Human capital results from learned skills that come from education, training or learning in general; consequently, it is closely related to on-the-job training (Becker, 1994). Following the literature on strategic human capital (Wright *et al.*, 2014), education or work experience affects the outcomes.

Social capital refers to the use of social ties to gain influence, control and power at work. Managerial cognition regards managers' beliefs and mental models that support their decision-making (Adner and Helfat, 2003), and it involves knowledge structures, mental processes and emotions (Helfat and Martin, 2015). Social capital examines social ties, such as

the characteristics of social networks and relationships (Helfat and Martin, 2015). With regard to the specific case of managers, Botts (2017) proposes consecutive influences among such components: human capital affects social capital and the latter affects cognition. Dynamic managerial capabilities directly influence the dynamic capability of the organization and, therefore, organizational performance. Nevertheless, we acknowledge that education is correlated with managerial cognition (particularly general intelligence, also termed “cognitive ability”; Ployhart and Moliterno, 2011) and that work experience is correlated with both managerial cognition and social capital.

Dynamic capabilities can be understood as a collective phenomenon that is supported at the individual level: it is the microfoundation approach. Such rationale focuses on the contribution of individual actions and interactions on firm heterogeneity (Pertusa-Ortega *et al.*, 2019). Our study follows the microfoundation framework by Eisenhardt and Martin (2000) that considers the individual (human capital), firm (managerial cognition) and structural (social capital) sources of dynamic capabilities and identify reconfiguration sources. Following the original work of Teece (2007), we acknowledge that Felin’s contributions (e.g. Felin *et al.*, 2012; Felin *et al.*, 2015) on microfoundation sources and interactions have inspired us. It is equally important to recognize the microfoundations of ambidexterity that occur at the individual level (Pertusa-Ortega *et al.*, 2019; Rotmans, 2019).

2.2.1 Human capital. Work experience is a measure of human capital (Helfat and Martin, 2015; Khanna *et al.*, 2014). Personal common history or previous experience of working together generates trust in the team’s interactions (Khan *et al.*, 2014) either in football or in the firm. Trust and knowledge sharing contribute to organizational commitment (Curado and Vieira, 2019). Loyalty and commitment are building blocks to produce dynamic capabilities for the creation and maintenance of organizational competitive advantage (Kay *et al.*, 2018). Knowledge is acquired through shared experience; working together (Berman *et al.*, 2002) leads to sharing preexisting knowledge (Cohen and Levinthal, 1990) that results in dynamic capabilities (Zahra and George, 2002). Human capital is the base of dynamic capabilities because it provides organizations with the possibility to sense, seize and reconfigure (Fallon-Byrne and Harney, 2017; Randhawaa *et al.*, 2020). Considering there are limits to the exploitation of current and preexisting knowledge, the returns of the exploitation strategy are more certain and closer in time and space. Exploitation without exploration may result in exploiting obsolete knowledge (Levinthal and March, 1993). Firms that are able to combine both knowledge management strategies and obtain complementary effects may aim to reach sustainable superior performance (Han and Celly, 2008). Organizations use their dynamic capabilities to simultaneously explore and exploit by generating their ability to adapt (Nayak *et al.*, 2020; Jansen *et al.*, 2009). Therefore, we put forward the following hypothesis:

H1. Human capital contributes negatively to the CMP.

The shared experience enlarges the stock of collective knowledge (Berman *et al.*, 2002). Since knowledge is acquired through shared experience (Berman *et al.*, 2002), more experience working together is positively related to improvisation (Vera *et al.*, 2016) or to group performance (Pelled *et al.*, 1999). Therefore, we propose that

H1a. A team’s experience working together contributes negatively to the CMP.

Organizations have different hierarchical levels (operational, tactical and strategic) with different tenures and different levels of influence on the results (Hitt *et al.*, 2001). Tenure affects the quality of the decisions made by diverse managers (Awino, 2013), and managerial work experience affects outcomes (Wright *et al.*, 2014). Accordingly, the shared experience of managers (coach and president) with the group should contribute to developing dynamic capabilities and consequently should affect performance. Therefore, we propose the following hypotheses:

H1b. The experience of the team and coach working together contributes negatively to the CMP.

H1c. The experience of the team and the president working together contributes negatively to the CMP.

2.2.2 Managerial cognition. Following Helfat and Martin (2015), we define managerial cognition as knowledge structures, mental processes and emotions. Managerial social capital involves social ties, characteristics of social networks and managerial relationships. The collective mind held by a group of individuals (Berman *et al.*, 2002) reflects the managers' beliefs and mental models that support their decision-making (Adner and Helfat, 2003). The manager's congruence with organizational goals increases dynamic capabilities (Botts, 2017) because organizational learning requires that various levels of behavior adjustment are in alignment (Crossan and Berdrow, 2003; Curado and Bontis, 2007).

The knowledge involved in the teams' actions during the season involves contributions from the coach and the president. They both contribute to the team's success and neither could do it alone as both possess only a portion of the total knowledge involved: both technical and relational. There is an interpretative component to common knowledge that reflects the understanding of how others are acting and adjusting their performance to environmentally changing conditions (Berman *et al.*, 2002). Consequently, the joint tacit knowledge developed among different levels of management in the team and the degree to which they understand each other based on their shared past have similar effects on performance.

Therefore, we propose the following hypothesis:

H2. The common experience of the team, coach and president during a season contributes negatively to the CMP.

2.2.3 Social capital. The manager's social capital affects the dynamic organizational capability (Botts, 2017). Social capital involves the knowledge of social relationships (mainly tacit) (Nelson and Winter, 1982). The stock of tacit knowledge results from learning over time (Berman *et al.*, 2002). The resource-based view posits that firms have different performances due to resource heterogeneity (Barney, 1991, 2001), such as having a unique combination of human resources (Wong and Karia, 2010). Unique knowledge developed over time from a diversity of organizational members determines different levels of performance. The interest in studying the effects of diversity on a workforce derives from the understanding that expanding its diversity can lead to an increase in performance (Ely and Thomas, 2001; Saxena, 2014).

Employees should integrate the knowledge and experiences from having such diversity to achieve high levels of performance (Ely and Thomas, 2001). We argue that given the collectivism and individualism of the game and given that each player is both a specialist and a generalist regarding their function in the pitch, the effect of diversity will reduce the CMP and enhance the results of the team. The knowledge diversity of individuals influences their ability to assimilate new knowledge and affects their ability to recognize the potential value of new knowledge and opportunities (Lowik *et al.*, 2017). Diversity in opportunity searching, creative problem-solving and risk-taking supports the microfoundations of dynamic capabilities that contribute to the team's outcomes that result in different levels of performance (Fallon-Byrne and Harney, 2017). Accordingly, we propose the following hypothesis:

H3. Diversity in average experience (social capital) contributes negatively to the CMP.

2.2.4 Internal contingencies. The strategic orientation is fundamental to understanding the way that dynamic capabilities arise (Berman *et al.*, 2002; Eisenhardt and Martin 2000). The

implementation of the proper strategic orientation creates suitable behaviors that facilitate performance (Narver and Slater, 1990). Dynamic capabilities are multiple and complex constructs (Eisenhardt and Martin, 2000; Sarkar *et al.*, 2016). In our research, we consider change versus stability in the strategic orientation. We assume that the president of a team embodies its strategic orientation. Therefore, a change in the president means a change in the strategic orientation of the team. We use this rationale in the study and so the following hypotheses are

H4. Stability contributes negatively to the CMP.

H4a. Strategic stability contributes negatively to the CMP.

Similarly, the change or stability of the team's coach may be significant because the tactical stability necessary to keep the routines and process allows for the recombining and integrating of resources to boost their value (Eisenhardt and Martin, 2000; Winter, 2003). Accordingly, we propose the following hypothesis:

H4b. Tactical stability contributes negatively to the CMP.

The availability and the mix of resources often influence the development of dynamic capabilities (Kor and Mahoney, 2005; McKelvie and Davidsson, 2009). When the firm operates in the service sector, or is a football team in our case, human resources are of high relevance given the need for their capabilities (Salvato, 2009). In a football team, a great part of the resources are the players, so a team with more available players should outperform the teams that have less available players. Hence, we propose the following hypothesis:

H5. The team size contributes negatively to the CMP.

3. Method

The context of a football competition creates a laboratorial setting where knowledge about competitors is high; and strategies, tactics and practices are quickly identified by all the teams. Further, a season has the immediate and disadvantageous nature of penalties for noncompliance with the rules that discourages nontransparent actions (Beck *et al.*, 2019; Berman *et al.*, 2002; Wagner *et al.*, 2019). The competitive rhythm and the emerging success depend essentially on the ability of each team to be effectively and steadily more competitive than its opponents over the season. Since competitive advantages are transitory (Sirmon *et al.*, 2010), coaches need to permanently improve the stock of capabilities at their disposal in order to outperform competitors.

Similar to business arenas, teams also have a goal – they want to win and have a maximum number of points that they can achieve with real live players who behave in a nonpredictive way. Using the sports' context, this research addresses the development of dynamic capabilities and their effect on performance. We label the Portuguese Football League scenario the Crystal Market, given the high transparency of the environment: the season schedules; the teams involved in each match and the characteristics of the teams' presidents, coaches and players that are well known across the League.

In this Crystal Market, the speed of renovation is high due to the specific context and strategic vision of the players (Ambrosini *et al.*, 2009; Liao *et al.*, 2009). Since dynamic capabilities evolve with environmental changes (Newey and Zahra, 2009; Schriber and Löwstedt, 2020), we propose they evolve linearly (Eisenhardt and Martin, 2000). As a result, the Crystal Market demands frequent changes based on preexisting knowledge. The resulting organizational transformation is a reaction to environmental change and a consequence of organizational experience that exploits its own resources and abilities by

learning and striving for their more effective use (Wójcik, 2015). The pace of change in the Crystal Market establishes the rhythm of the evolution of dynamic capabilities that adjusts to environmental dynamism (Schriber and Löwstedt, 2020). The Crystal Market reflects weekly developments of dynamic capabilities that affect short-term performance through decisions and necessary adjustments. Similar to the pressure of market forces that generate “feedback” effects on firms (Teece *et al.*, 1997), teams use their empirical sensitivity, which is a collective ability, to identify their perceptions of constant environmental changes. A team’s coherent and effective strategy rests on its collective ability to sense small environmental changes on a daily basis (Nayak *et al.*, 2020). In short, we propose that a Crystal Market represents pure competition, complete competitive knowledge and short-term decision-making.

The complete sample consists of 340 matches contested in the Portuguese Football League over ten seasons (from 2008/2009 to 2017/2018) for a total of nine participating club teams. Archival data were obtained from the publicly available websites. Following Almeida and Volossovitch (2017), we retrieve our data from the official website <http://www.zerozero.pt> and from the Portuguese Football League (website <http://www.ligaportugal.pt>). We compared both websites and found no discrepancies. For this study, we have used data about the players, the coaches and the president of the teams for the sample period.

3.1 Sample, data, and variables

The sample used in this study comprises the nine teams that continuously participated in the league for ten years in a row (from 2008/2009 to 2017/2018). Not all of the 18 teams remained in the competition for this entire period. Each year the teams in the lower two positions in the final rankings are withdrawn from competition in the following year. We only consider the ones that participated in the ten successive seasons, and we have complete data on each of those teams. The data present the records of scores in each season, the number of players on each team and the coach and the president of each team.

3.1.1 Dependent variable. *CMP* is the difference between the maximum score possible and the real score for a team in each season ($CMP_i = 0\%$ for team (*i*) that had the maximum points possible in the season; $CMP_i = 100\%$ for team (*i*) that had zero points).

3.1.2 Independent and control variables. The variables for *human capital* in the study are proxies for the capabilities of the team. These capabilities come from experience and on the job training. Work experience is explicitly a measure of human capital (Helfat and Martin, 2015; Khanna *et al.*, 2014).

Experience of team working together (hours together in each season) is similar to the cumulative experience shared with other team members (Berman *et al.*, 2002). This variable reflects the mean number of hours of the team working together for each player at the end of the season.

Experience of team and coach working together reflects the number of hours of experience that the team had with the coach at the end of a season.

Experience of team and president working together reflects the number of hours of experience the team had with the president at the end of a season.

3.1.3 Managerial cognition. Managerial cognition regards the overall interpretation of common knowledge that reflects the understanding of how the others are acting and adjusting their performance to environmentally changing conditions. It concerns the managers’ beliefs and mental models (Adner and Helfat, 2003); and it involves knowledge structures, mental processes and emotions (Helfat and Martin, 2015). Since there are two levels of management considered in the study (coach and president), the proxy variable adopted to measure it is:

Experience of team, coach and president working together is the product of the number of hours of experience the coach had with a specific team at the end of a season times the number of hours of experience the president had with a specific team at the end of a season.

3.1.4 Social capital. Social capital regards the diversity of personal networks and relational patrimony that the team members gather. Individuals build their social networks throughout their lives. A football player is usually someone with a relatively short career, nevertheless he acquires such patrimony as the seasons go by. The nature of a football player's knowledge is essentially tacit and has an incremental characteristic throughout his maturing process as a professional player. Thus, we assume there is a positive correlation between age and the level of tacit knowledge of each football player. By using the age dispersion of the players as a proxy for the social capital that coexists in a team, we seek to capture the essentially tacit source of knowledge gained through the individual experience that is brought to each team by each player and is used to ensure better results for the team.

Diversity in mean experience is the proxy that we adopt to measure social capital and is the standard deviation in the ages of the players.

3.1.5 Internal contingencies. Regarding internal contingencies, we measure three variables.

Stability of strategy is a dummy variable that is equal to one if the president of the team is the same as in the previous year.

Stability of tactics is a dummy variable that equals one if the coach of the team is the same as in the previous year.

Team size controls for the availability of resources for the team and is measured as the number of players available to the team in each year for its matches.

3.2 Data analysis and model estimation

We test our hypotheses by means of a linear regression with the CMP as a function of the independent and control variables that measure human capital, managerial cognition, social capital and internal team characteristics. The estimations were performed with STATA.

Since our data refer to a panel of teams in a league where every team plays with each other every year, a cross-sectional correlation should occur together with a serial correlation over time. These issues must be considered in the estimation. [Reed and Ye \(2011\)](#) study the performance of several panel data estimators with correlated observations and recommend using a feasible generalized least squares (FGLS) to preserve efficiency. Hence, we estimate our models with the FGLS in which serial correlation over time follows an autoregressive process of order 1, AR(1), and heteroskedasticity and cross-sectional correlation are of unknown forms [1]. [Berman et al. \(2002\)](#) investigate the role of the tacit knowledge in a firm by modeling team performance with data from the National Basketball Association (NBA) by using a pooled OLS (Ordinary Least Squares) with Kmenta's double transformation. Our approach is based on more general assumptions and consequently is more robust to misspecification. For details on estimation panel data models with cross-sectional dependence see [Sarafidis and Wansbeek \(2012\)](#).

4. Results and discussion

[Table 1](#) presents the descriptive statistics of the sample. They show that the mean CMP in the period under analysis is 0.46. On the other hand, only 33% of the teams have stability of tactics while 88% have stability in strategy. The mean shared experience in the sample is around 46 h, while the diversity in mean experience is 3.9 years. The correlation coefficients show that CMP has a negative correlation with most of the variables. Exceptions are the team

Table 1.
Descriptive statistics
and correlations

	1	2	3	4	5	6	7	8	<i>M</i>	SD	Min	Max
1 Closeness to market potential (CMP)									0.46	0.18	0.13	0.73
2 Stability of tactics	-0.18**								0.33	0.47	0.00	1.00
3 Stability of strategy	-0.08	-0.02							0.88	0.33	0.00	1.00
4 Experience of team working together	-0.52*	0.17**	0.17						46.44	12.63	25.82	82.93
5 Experience of team and coach working together	-0.42*	0.52*	0.00	0.57*					74.70	75.49	12.91	429.94
6 Experience of team and president working together	-0.57*	0.04	0.25*	0.40*	0.19**				483.24	487.42	24.24	1958.52
7 Experience of team, coach and president working together	-0.57*	0.43*	0.20*	0.45*	0.67*	0.71*			790.32	1122.27	12.12	5804.01
8 Diversity in mean experience	0.07	0.17	-0.00	0.08	0.12	-0.19**	-0.07		3.90	0.67	2.11	5.45
9 Team size	0.35*	-0.08	0.07	-0.43*	-0.19**	-0.12	-0.16	-0.08	29.19	3.16	21.00	37.00

Note(s): The table presents the descriptive statistics for the mean (*M*), standard deviation (SD), minimum (Min) and maximum (Max) for all the teams observed in the period from 2009 to 2018 for a total of 90 observations and the correlation matrix for the main variables. The * and ** represent significance at * $p < 0.05$ and ** $p < 0.01$

size with a positive relation with CMP and the diversity in mean experience with a non-significant, correlation coefficients.

Table 2 presents the regression estimates. The table shows that the team’s experience working together has a positive influence on the CMP (0.00263). However, when we combine the effect of shared experience with the coach (*Team and coach working together*) (−0.0015) or with the president of the team (*Team and president working together*) (−0.00021), the CMP decreases. Such evidence supports H1b and H1c but not H1a. However, the joint effect of the experience of the team, coach and the president working together on the CMP is positive (0.00002) that does not support H2. The diversity in mean experience affects the CMP in a positive but nonsignificant way that does not support H3. The results show opposite effects on the CMP. The stability in tactics has a positive effect (0.02180) on the CMP, and the stability of strategy has a negative effect (−0.02390) that supports H4b but rejects H4a. Finally, H5 has no support for the team size positively affecting the CMP (0.01590).

4.1 Discussion

The experience of the team working together has a significantly positive effect on the CMP that means it increases the difference between the team’s real performance and the maximum performance possible. This result indicates that teams with more shared experience have worse performances, which is not consistent with Berman *et al.* (2002). Although this result does not support H1a, it may result from a complex phenomenon, namely the conflicting contributions of keeping the same players (and consequently the same knowledge) for a long time. A reasonable explanation for this finding comes from considering that players share their knowledge over time that limits the ability to exploit current and preexisting knowledge.

Variable	
Constant	−0.28925* (0.00576)
Experience of team working together	0.00263** (0.00064)
Experience of team and coach working together	−0.00015* (0.00007)
Experience of team and president working together	−0.00021** (0.00002)
Experience of team, coach and president working together	0.00002* (0.00001)
Diversity in mean experience	−0.00099 0.00704
Stability of strategy	0.02180* (0.00898)
Stability of tactics	−0.02390** (0.00576)
Team size	0.01590** 0.00120
<i>n</i>	90
Test of overall significance	1021.99
<i>P-value</i>	0.000

Note(s): The table includes the FGLS pooled linear panel regression with robust standard errors in parentheses that is consistent under the presence of AR(1) autocorrelation within panels, cross-sectional correlation and heteroskedasticity across panels. The ** and * indicate statistical significance at 1 and 5%, respectively

Table 2. Regression estimates

The longer the team plays together, the more probable it keeps exploiting long-standing knowledge.

Making a parallel to business management, a longer common history or previous experience in working together generates trust in the team's interactions (Khan *et al.*, 2014) that leads to the creation and sharing of knowledge. Preexisting knowledge (Cohen and Levinthal, 1990) and sharing it (Curado *et al.*, 2017) are key antecedents of absorptive capacity that in turn results from dynamic capabilities (Zahra and George, 2002). Trust and absorptive capacity are closely related to long-term relationships that are associated with low turnover rates. Yet, when a firm works in a situation that resembles a football season, for instance the bank and pharmaceutical industries (Curado *et al.*, 2014; Kale and Wield, 2008), it is operating in a highly regulated industry in which its actions are systematically observed by all actors in the industry. When the firm keeps the level of personal rotation low, the returns from exploiting preexisting knowledge may result from exploiting obsolete knowledge (Levinthal and March, 1993). That is the limit of exploitation (March, 1991); when preexisting knowledge becomes obsolete firms need to introduce new knowledge through an increase in the level of personal turnover.

Considering the results from testing H1b, the experience of the team and coach working together negatively influences the CMP that means team performance comes closer to the maximum possible performance. The coach's prior experience with the team does influence its performance that clearly shows tactical alignment. The effect of tacit knowledge plays an important role here. The coach of a football team is like a middle manager that transforms the strategy of the organization into day-to-day practice. In reality, coaches implement the strategy through the resources available, the players. The coaches rely on their knowledge about the players and about the competitors. A lot of that knowledge is tacit and results from their experience with the players and the league. Parallel to the firms' world, the managers consciously or unconsciously use their knowledge of the firm's employees as well as their knowledge about the market to craft the best actions possible to achieve the desired objective.

The findings from testing H1c show that the team and president working together has a significantly negative effect on the CMP that means it reduces the difference between the team's real performance and the maximum possible performance. Such a result indicates that a president with greater shared experience with the team positively influences its performance that reflects strategic alignment. Such a finding demonstrates that the president's strategic knowledge about the team is relevant to insuring good results. In parallel, the manager's prior experience at the firm contributes to good results as it gives management long-term stability that ensures that the defined strategy has time to produce the desired results. This positive effect may also be related to tacit knowledge accumulation (Awino, 2013; Hitt *et al.*, 2001), which potentially has a positive effect on outcomes (Wright *et al.*, 2014).

Considering these results, the influence of human capital, despite the unexpected effect of the experience of the team working together on the CMP, corroborates the main literature. We consider the contradictory evidence on the team's experience as support of the contradictory contributions to achieve superior performance. This research shows that in highly regulated industries, the experience of working together has a decisive influence on the development processes of dynamic capabilities, at least at the human capital level.

The results from testing H2 show that the managerial cognition from the interaction among the coach, the president and the team has a minor, but significantly positive, effect on the CMP that means it increases the difference between the team's real performance and the maximum performance possible. This result indicates that the coach and the president's beliefs, knowledge structures and mental models do not contribute to better performance levels. This finding resembles the effect of the experience of the team working together. It might be implicit in this result the struggle between different objectives pursued by the three

forces: players, coach and president. The first strives to enhance their individual value, the second fights to strengthen the team and the third juggles the efficacy of the team with its efficiency and financial returns. The first strives to capture as much new knowledge as possible that is implicitly or explicitly an exploration attitude. The second one tries to use and share knowledge among the players that is an exploitation- focused option. The financial restriction forces the president to strive to obtain maximum returns from the knowledge. There is a limit to the knowledge exploitation (March, 1991) because prior knowledge becomes obsolete. Thus, firms (teams) need to introduce new knowledge to the organization that leads to personnel turnover. As a result, the longer the coach and the president of the team work together the market potential is more difficult to get closer to. So, our results for H1a and H2 support the literature that shows that it might be important to keep a healthy level of managerial and employee turnover at the firm.

The results from testing H3 show that this variable is not significant in its contribution to the CMP that reflects one of two possibilities. The most obvious is the wrong choice of the proxy; we could have used other options, like the number of previous teams that the players had participated on or the number of coaches they had previously worked with. The other possibility stems from the fact that football is a collective activity where players are essentially young people and whose individual market value is their real measure of individual success. Consequently, from the individual point of view players do not have a great incentive to activate their social network (mainly tacit) (Nelson and Winter, 1982) during each season. Incidentally, Maderer *et al.* (2014) test this idea in their work with data from professional football teams. They find that age diversity has a negative effect on the success of the teams. But we argue that the effect should be positive. According to our results, diversity in mean experience negatively affects the CMP. Sadly, the result is not statistically significant, demanding more research. Looking into such results with the eyes of a managerial researcher, the result indicates that expanding the diversity of the workforce will lead to better performance (Ely and Thomas, 2001; Saxena, 2014). The results do not contradict this, but with this sample they lack statistical significance.

Concerning internal contingencies, some of the most common factors are top management and management characteristics (Gremme and Wohlgemuth, 2017) and to the abundance of resources (McKelvie and Davidsson, 2009). We have chosen to address changes at both levels: top management and management as internal contingencies because such changes have an effect. We have also adopted the team size as a proxy of for the abundance of resources.

The results from testing H4a show that strategic stability is contrary to our hypothesis: the results indicate that this kind of stability positively affects the CMP that means it enlarges the difference between the team's real performance and the maximum performance possible. This result seemingly contradicts our previous findings on the human capital contribution to the CMP. But in fact, that is not the case. The job of the president of a team demands that they adopt a strategy driven by both efficacy and the efficiency. Efficacy refers to the fact that the job is subject to public scrutiny from the fans who voted to elect the president. The fans have a relationship with the team that is not rational (Biscaia *et al.*, 2012) rather it is quite emotional and is dependent on electoral promises and the results of the team at reelection time. Efficiency reflects the need to present a balanced accounting, to comply with the financial fair play (e.g. UEFA, 2018) and to attract investments to the team. The dilemma regards an almost impossible challenge: to simultaneously pursue efficacy and efficiency to be reelected. So, the president faces a dilemma in which the efficiency overcomes the efficacy given the pressure to attract money to the team and to keep playing in the league (e.g., UEFA, 2018).

Such results indicate that reaching an equilibrium in dynamic capabilities requires the constant shift among opposing strategies: exploitation and exploration. Thus, our results show that organizations need to balance seemingly paradoxical forces to achieve superior performance (Han and Celly, 2008). Therefore, the understanding of the exploitation versus

exploration tensions demands further research to find the optimal alignment between the resources that the firm devotes to either.

The results from testing [H4b](#) show that tactical stability has a significantly negative effect on the CMP that means it decreases the difference between the team's real performance and the maximum performance possible. Such a result indicates that pursuing coaching stability increases performance and is consistent with the literature on leadership trust ([Henriques et al., 2014](#); [Werbel and Lopes Henriques, 2009](#)). As a parallel to firm management, this kind of practice is associated with a stable management team. This team develops a relationship based on trust among all members (managers and subordinates) and that relationship fosters the sharing of tacit knowledge that is appropriate for participating in highly competitive environments. Over time the manager becomes a mentor who holds the knowledge of the firm and works as a knowledge repository available to facilitate the work of the other employees ([Henriques and Curado, 2009](#)).

The results from testing [H5](#) show that team size has a significantly positive effect on the CMP that means it enlarges the difference between the team's real performance and the maximum performance possible. This result indicates that having greater resources is counterproductive. The teams with a high number of players cannot play them in all the matches or use them for the entire duration of each match. The team can only use 11 players at a time. Thus, some players do not participate (or just play for a few minutes each week), and, hence, they do not develop the optimal personal efficiency and group synergies. Some parallels to firm management can be established, such as not using full capacity in which the firm does not explore the intended full load of sustained output of an organizational unit. Another possible explanation results from the financial consequences of having more unused resources, such as increased maintenance and storage costs. Although our findings may somewhat conflict with the dynamic capabilities literature, they are not contradictory to the general assumptions of the resource-based view, since having more resources does not mean that they are more unique.

5. Conclusions

Our findings use data from sports seasons showing it is a fruitful opportunity to conduct studies on human and social capital management and managerial cognition in developing dynamic capabilities based on knowledge management. This study contributes with the proposal of a competitive setting to address the relation between dynamic capabilities and organizational performance: the Crystal Market. We study the internal sources of the development of dynamic capabilities when using two main strategies: exploitation and exploration. The study shows how to reach the highest competitive advantage: to be as close as possible to a firm's market potential. Teams react during the season to reach adaptive advantage that leads to competitive advantage ([Nayak et al., 2020](#)). Although we do not find support for all the hypotheses, we can conclude that the dimensions studied have an influence on the development of dynamic capabilities. We argue that the most significant conclusions come from the rejected hypotheses.

The results indicate that human capital is of decisive importance to the team's performance. Although the study did not support [H1a](#), the interpretation of this nonacceptance allows us to understand that in specific scenarios where activities are strongly regulated and players have short and intensive careers, the current literature stream on dynamic capabilities may not apply. With regard to managerial cognition, the findings do not support [H2](#) that addresses the importance of the alignment between the different levels of the organization: strategic, tactical and operational. However, we may consider as partial support of the hypothesis the contribution of tactical and operational alignments as well as strategic and operational ones (team and coach's experience working together and team and

president's experience working together, respectively). Such results provide theoretical contributions on the support of managerial cognition as an important source of competitive advantage, responding to Arndt and Pierce's (2018) claim on the gap in the theory of firm-level competitive advantage being related to the recognition of the particular asset arrangement role that management can play. Regarding social capital, the results do not allow us to make interpretations or conclusions considering its lack of statistical significance.

Regarding the variables related to internal contingencies, the results show two aspects to account for when considering the sources of dynamic capabilities. On the one hand, they show contradictory influences of the tactical and the strategic stabilities. On the other hand, they indicate the concept of a "parsimonious size" of resources to achieve the team's objectives. Evidence from H5 indicates that the best theoretical support for the Crystal Market may be the knowledge-based theory (Curado and Bontis, 2006) and not dynamic capabilities. The relevance of using a scenario such as the football season applies to the study of the development of knowledge-based dynamic capabilities.

In summary, the following main practical implications for managers emerge:

- (1) Maintain an optimal level of team turnover – maintaining a "healthy" flow of new knowledge without jeopardizing the team's performance is a challenge for the organization's decision-makers. Being successful in this challenge ensures that the organization will find a balance between exploitation and exploration of knowledge that leads to the right pace for innovation to reach a higher level of competitiveness. This contribution is especially important in the current context of an aging workforce and in the use of face-to-face and remote work in complementarity.
- (2) Looking for both efficacy and efficiency is not a safe bet for managers, since in a situation of scarce resources, efficiency tends to captivate managers more in the long run than efficacy. Therefore, long-term planning that includes both strategies is important, but at different times, so that in the long run the aggregate result is positive.
- (3) Sustaining a high reserve of resources is not a good option, this way organizations must find the appropriate level of resources for the challenges they face. This level helps them achieve the proper individual achievement of the team members and, consequently, the optimum levels of individual and collective motivations that guarantee high levels of team competitiveness.
- (4) The relevance of the fit of the work teams with the management bodies (intermediate or top) leads to desirable consequences in the performance of the relationships and trust that are developing.
- (5) Tactical stability is reflected in improved performance, justifying each manager's "style" or "path". Team leaders who perform consistently over time and maintain their tactics achieve better performances.

Practical and managerial contributions delivered by the study are applicable in organizations regardless of profitable goals and objectives due to the use of an original measure of market performance. Thus, even though the setting in the study is a sports season, it offers a rationale that applies to society at large. Our findings serve managers from a variety of organizations, from public to private, for-profit or not.

Theoretically, with this work we contribute to the strengthening of the use of alternative scenarios in management research. We also add to the knowledge about the way that human and social capitals and managerial cognition and internal contingencies influence the development of knowledge-based dynamic capabilities, especially in highly regulated

industries such as sports clubs. For managers, this work provides evidence on the importance of strategic coherence at the different structural levels of the organization. Our results show the unnecessary need to fight the natural struggle for more resources by demonstrating rather that the struggle should probably be related to getting the right resources at the right time.

This study can be a precursor for a future line of investigation. We anticipate such work will contribute to the broadening of knowledge on tightly regulated scenarios that use resources with an intrinsic individual market value. We are aware that some limitations apply to the study. They emerge from the laboratorial setting we use that only partially matches the conditions of real markets. We also acknowledge the use of successful teams in the football season.

Note

1. We use the procedure `xtgls` from STATA.

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