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Resource orchestration in the context of knowledge resources acquisition and divestment. The empirical evidence from the Italian "Serie A" football

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ABSTRACT

We investigate how resource orchestration influences performance within the 'knowledge resource management' approach by exploiting a novel database on the Italian Serie A top-professional football league spanning from the 1960–61 up to the 1991–92 season. We find that the acquisition of experience via newcomers has a U-shaped non-monotonic relationship with performance. Furthermore, we find that releasing co-specialized employees has a positive moderating role within the relationship between team experience and performance by suggesting that dismissing old routines positively influences the relationship between current routines and team's performance.

1. Introduction

In this study, we aim to investigate how resource orchestration (Helfat et al., 2007; Sirmon, Hitt, Ireland, & Gilbert, 2011) affects performance at the firm level in the context of decisions concerning the management of knowledge resources (Kogut & Zander, 1992).

The notion of resource orchestration[1] constitutes a recent development in the broader area of resource-based studies. It focuses on how managerial decision making affects performance by means of decisions concerning resource management processes (Helfat et al., 2007; Sirmon et al., 2011). In particular, Helfat et al. (2007) maintain that resource orchestration decisions address two broad areas, namely, search/selection and configuration/deployment. Accordingly, in this study, we investigate the different effects of resource orchestration in the context of knowledge resource management, and we focus on the first area of resource orchestration decisions, i.e., search/selection, with specific attention paid to the acquisition of new resources and the release of current resources.

More precisely, we aim to explore whether the contribution of newly acquired knowledge resources, as a whole, depends on the industry-level experience of such resources. Previous research has posited that an individual's experience is a relevant knowledge resource (Reagans, Argote, & Brooks, 2005; Huckman & Pisano, 2006) that is transferable across firms (Castanias & Helfat, 1991; Holcomb, Holmes, & Connelly, 2009); however, previous studies have not examined whether and how different levels of newcomers' experience, as a whole, affect firm performance. Furthermore, we investigate whether the release of co-specialized employees' tacit knowledge affects the focal unit's performance. Although prior studies have maintained that inertia transforms routines into traps (Levintal & March, 1993), we investigate whether the release of routines (i.e., co-specialized employees' tacit knowledge) sustains (or hampers) firm performance. In particular, we investigate whether the release of co-specialized knowledge resources moderates the performance of current co-specialized

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[1] In the context of resource orchestration, Sirmon et al. (2011) define the process of acquiring, accumulating and divesting resources as resource structuring.

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employees.

We argue that resource orchestration in the context of knowledge resource management deserves accurate research efforts because the renewal of such resources is unavoidable (sooner or later)[2] and is likely to produce important consequences for a firm's most critical source of competitive advantage.

To address the above issues, we conducted research in the context of "*Serie A*", the Italian top-level professional football league, from 1960 to 1992. Sports settings are particularly suited to management research (see Day, Gordon, & Fink, 2012; Wolfe et al., 2005) because they frequently allow for the observation of phenomena of particular interest from the viewpoint of the orchestration of knowledge resources, such as the fit between a given strategy and the available knowledge resources (DiMinin et al., 2014; Sirmon, Hitt, & Ireland, 2008; Wright, Smart, & McMahan, 1995); individual and collective skills and tacit knowledge (Berman, Down, & Hill, 2002; Shamsie & Mannor, 2013); resource management and value creation (Holcomb et al., 2009); knowledge resource bundling (Sirmon et al., 2008); knowledge resource acquisition and release (Moliterno & Wiersema, 2007); interorganizational co-mobility of knowledge resources (Campbell, Saxton & Banerjee, 2014); performance comparisons (Moliterno, Beck, Beckman, & Meyer, 2014); and resource complementarity (Crocker & Eckardt, 2014; Ethiraj & Garg, 2012). Furthermore, although football teams may differ in terms of size, age and historical relevance (from a sporting viewpoint), they share a common market for resources (factors) and a general environment.

Our study makes the following contributions. First, we show empirically that new knowledge resource acquisition must be examined as a collective resource and not as a sum of individual resources. In particular, insofar as the acquisition of new knowledge resources is concerned, we observed a non-monotonic relationship (i.e., a U-shaped relationship) that emphasizes the role of newly acquired knowledge as a collective resource. In addition, our study is (among) the first to explore the effect of released employees' co-specialization on a team's results. More precisely, we find a positive moderating role on the relationship between team experience and performance. This finding suggests that the dismissal of *old* routines positively influences the relationship between *new* routines and performance, thus shedding new light on an important interaction concerning the effectiveness of knowledge resources.

2. Theory and hypotheses

Recent research has clarified that resource-based studies require additional development insofar as resource management is concerned (Sirmon, Gove & Hitt, 2007). Accordingly, we endeavor to investigate how resource orchestration (Hefalt et al., 2007) in the context of knowledge resource decisions addresses this issue with respect to search/selection decisions. In particular, we focus on those specific decisions concerning the acquisition of new resources in the form of new employees' experience and the release of such resources in the form of the dismissal of co-specialized resources, and we examine the effect of both types of decisions on performance.

2.1. The impact of new employees' experience on performance

Several studies have investigated the relevance of individuals' experience (Castanias & Helfat, 1991; Coff, 1999; Dokko, Wilk, & Rothbard, 2009; Holcomb et al., 2009) and its impact on firms' results (Argote, McEvily, & Reagans, 2003; Edmondson, Bohmer, & Pisano, 2001; Huckman, Staats, & Upton, 2009; Reagans et al., 2005). These studies[3] unanimously conceive of an individual's experience as a valuable resource in terms of its contribution to a unit's results. Individual experience has also been studied as a proxy for learning and tacit knowledge (Argote & Ingram, 2000; Huckman & Pisano, 2006; Shamsie & Mannor, 2013). In particular, such research has noted that although an individual's experience is a critical asset, its effect is frequently contingent on routines and contextual knowledge rooted at the organizational level. Furthermore, a given individual's experience has been examined from the viewpoint of human capital development (Lepak & Snell, 1999; Moliterno & Wiersema, 2007). For example, Lepak and Snell (1999) maintain that human capital experience can be appraised based on the degree of its development. More precisely, more *seasoned* and experienced individuals are valued as developed and *ready-to-use* resources whose contribution is expected to be fully productive in the short run. In Major League Baseball (MLB), Moliterno and Wiersema (2007) conceive of those individuals who had previously acquired substantial experience in the league as developed resources. In summary, research and studies on the contribution of an individual's experience to firm performance have produced an articulated picture; however, they have neglected the role of resource orchestration, that is, the collective and shared effect of newly acquired knowledge resources (i.e., newcomers) beyond the effect of the single, newly acquired resource.

To fill this void, we maintain that the orchestration choices regarding acquisitions must be observed with respect to the characteristics of newcomers not as if such individuals were standalone assets but as if they were a whole, collective resource because, following Alchian and Demsetz (1972), the contribution of a group of individuals at the team level is more than the sum of the single contribution of those individuals to the team. This phenomenon occurs because complementarity among resources is likely to affect performance in a differentiated manner (Milgrom & Roberts, 1990). Accordingly, we maintain that the level of experience among new knowledge resources is likely to affect performance in a differentiated fashion that particularly depends on their experience at the industry level. Individual experience at the industry level is a relevant indicator of professional skills (Castanias & Helfat, 1991; Dokko et al., 2009). In contrast to other types of experience that are considered to be contextual and firm-specific, individual experience at the industry level is considered to be highly transferable across firms (Reagans et al., 2005; Holcomb et al., 2009). Although individual experience is transferable across firms, we do not know how different levels of collective knowledge resources might affect a new unit's performance. Similarly, we have no empirical evidence regarding whether a group of new employees would affect the performance of their new employer in a differentiated fashion based on a given level of collective experience. Because the collective level of experience of new knowledge resources contributes to defining the resource strategy adopted by a given manager, we argue that it is important to examine whether and how such a strategy affects performance. To address this issue, we consider the collective experience of newcomers when such employees join a new firm and examine how different levels of newcomers' experience affect the unit's performance.

The effects of newcomers on performance has produced contrasting results in the literature, although it has received increasing

[2] As reported by Rink et al. (2013: 248), "*In the USA, for example, the median duration of tenure with a current employer is approximately four years (U. S. Bureau of Labor Statistics, 2011)*".

[3] A review of this stream of literature is beyond the scope of this manuscript. For a detailed examination, see Argote et al. (2003) and Reagans et al. (2005).

attention from managerial studies (Berman et al., 2002; Campbell et al., 2014; Chen, 2005; Groysberg, Lee, & Nanda, 2008; Groysberg & Lee, 2009; Rink, Kane, Ellemers, & Van der Vegt, 2013). The general – and somewhat surprising – conclusion shared by these studies is that, although some level of knowledge resource renewal is unavoidable, its effect will most likely be negative. For example, Berman et al. (2002) hypothesized a negative relationship with respect to the contribution of new players to performance. In addition, several other studies have found that new employers may experience some problems receiving newcomers and must develop specific integrative procedures to reduce the negative effects of newcomers' presence and performance (Chen, 2005; Dokko et al., 2009). Furthermore, in studying the financial investment industry, Groysberg et al. (2008) observes that even highly skilled individuals suffer performance declines upon joining new employers, and Groysberg and Lee (2009) report in an empirical study that such a decline also affects their new employer's results. This finding is also consistent with theoretical developments in the collective turnover literature concerning, in particular, how newcomers' firms-specific proficiency affects performance (Hausknecht & Holwerda, 2013). In sum, the literature seems to suggest that newcomers negatively impact firm performance, although there are contrasting views on this phenomenon.

To overcome the contrasting results provided by the extant literature, we maintain that the relationship between new employees' contribution and performance could be non-linear (i.e., U-shaped), that is, first decreasing in the presence of low levels of new employees' experience up to a certain point, and then subsequently, beyond this point, higher levels of new employees' experience are amenable to exerting a positive effect on performance. In the remainder of this subsection, we clarify the motivation for this non-linear (U-shaped) relationship.

A low level of new employees' experience (i.e., a few individuals characterized by low experience) is amenable to producing a decreasing effect on performance because the presence of less experienced newcomers is likely to create uncertainty among the current teammates because such resources are less trained compared with their more experienced colleagues (Lepak & Snell, 1999) and because a low level of experience will sometimes lead to mistakes (Weick, 1993). In addition, the current teammates are unsure of exactly what the newcomers know (lack of relationship knowledge – Reagans et al., 2005); therefore, they suffer from uncertainty while executing established routines. Furthermore, it is likely that a small number of newcomers characterized by low knowledge and understanding of the unit's current routines will require some time before they become integrated team members; therefore, we expect that their utilization will produce decreasing results up to a certain level of new employees' experience.

However, beyond this level of new employees' experience, we expect that their presence at the unit level is likely to produce increasing results because it will be associated with the substantial presence of more experienced individuals. Highly experienced knowledge resources are likely to offer a ready-to-use skill set that is easily exploitable at the firm level (Lepak & Snell, 1999) because highly experienced individuals have the readiness and motivation of developed human capital and thus are able to provide their best contribution over the short term (Argote & Ingram, 2000; Huckman et al., 2009; Tucker, Nembhard, & Edmondson, 2007). More precisely, their contribution takes the form of a set of ready-to-use skills that enlarges their new firm's repository of knowledge and, at the same time, broadens the new unit's *repertoire* of behaviors and actions, thus making its conduct more innovative and less predictable. Furthermore, because they are experienced individuals, their current teammates know what they know; thus, there is no uncertainty with regard to their relationship knowledge. Therefore, thanks to the experience of the new employees, the new unit will be able to effectively address an increased number of environmental conditions and face competitors with increased competitiveness. We therefore maintain that, beyond a certain level, higher levels of new employees' experience are likely to render the firm more competitive and innovative – and less predictable – and that such occurrences positively affect its performance. These considerations lead us to the following hypothesis:

Hypothesis 1. *There is a non-monotonic (U-shaped) relationship between the experience of new employees and performance. More precisely, lower levels of new employees' experience are likely to produce decreasing results up until a given point; however, beyond this point, higher levels of new employees' experience are likely to produce an increasing effect on performance.*

2.2. The effect of released employees' co-specialization on performance

Knowledge resource renewal is unavoidable for many firms that are driven by demographic, mobility and competitive considerations (Coff, 1999; Lepak & Snell, 1999), which implies that firms recurrently release a given amount of co-specialized employees. Because such releases include a portion of the firms' co-specialized knowledge and shared experience (Aime, Johnson, Ridge, & Hill, 2010; Wezel, Cattani, & Pennings, 2006), it seems important to investigate whether they might prove detrimental to the firm's performance.

The strategic management and organizational theory streams of literature have devoted substantial attention to the analysis of shared experience and co-specialized tacit knowledge (herein, co-specialization) at the firm level (Berman et al., 2002; Huckman et al., 2009; Katz, 1982; Reagans et al., 2005; Shamsie & Mannor, 2013). Some of these studies empirically observe a non-monotonic (i.e., inverted U-shaped) effect of co-specialization on performance (Berman et al., 2002; Katz, 1982), which implies that, beyond a certain level of shared experience, a firm becomes predictable and its knowledge ossified. Other studies have instead maintained and empirically found a linear relationship between employees' co-specialization and performance (Huckman et al., 2009; Huesch, 2013; Reagans et al., 2005). For example, in the context of healthcare, both Huesch (2013) and Reagans et al. (2005) find a positive relationship between the degree of co-specialization and operating- and caring-team and performance; similarly, Huckman et al. (2009) observe a positive effect for co-specialization (i.e., team familiarity) on performance in the software industry. In addition, Shamsie and Mannor (2013:516) refer to co-specialization by distinguishing between discrete and linked productive tacit knowledge; the former connotes the tacit knowledge related to a specific task held by individuals, whereas the latter (i.e., co-specialization) "*refers to the application of the knowledge of the larger group to the performance of the same task or activity.*" All of the above studies concur in emphasizing the critical role of co-specialization held at the collective level and socially embedded within an organization. Furthermore, the empirical evidence reported above almost unanimously – with a few exceptions, such as Berman et al. (2002) – finds that co-specialization positively affects performance with no decreasing effects due to either inertia or ossification.

However, while remarking about the relevance of co-specialized tacit knowledge and its effect on performance, the previous literature has not probed into the inverse phenomenon (that is, what happens when such co-specialized tacit knowledge is subtracted from a given unit). The critical issue is that the collective tacit knowledge stemming from individuals' mutual co-specialization is

not simply the sum of the individuals' tacit knowledge (Alchian & Demsetz, 1972; Kogut & Zander, 1992); in addition, the release of co-specialized employees subtracts a part of the focal unit's functioning mechanism (Reagans et al., 2005). These studies lead us to consider that once a portion of co-specialized knowledge is subtracted from a given team or unit, the remaining part of that team's processes will be somewhat hampered and its performance negatively affected. For example, studies on the cognitive nature of routines emphasize the holistic nature of the interrelations among individuals when they are executing routinized tasks (Weick & Roberts, 1993). These findings imply that the release of a portion of such interrelations from the unit's collective mind (Weick & Roberts, 1993) is equal to subtracting a portion of the instructions from an information system: the system likely either ceases to function or works only partially. A similar concern is also shared by studies that investigate collective turnover (Hausknecht and Trevor, 2011; Nyberg & Ployhart, 2013).

Furthermore, studies on collective experience and learning maintain that firms can be conceived of as networks of people; within these networks, individuals know whom to contact about specific issues and the precise competence of their co-workers (Groysberg et al., 2008; Huckman & Pisano, 2006). For example, Pisano, Bohmer, and Edmondson (2001) find that effective surgical teams need minimum verbal communication because their interactions and repeated cooperation provide the basis for a type of communication that is largely based on tacit knowledge. Likewise, Huckman and Pisano (2006) emphasize the complementarity existing among team members' tacit knowledge and argue that such complementarity might be dissipated if the composition of the team is changed. Indeed, given the contingent nature of collective co-specialized knowledge, when the current members of a given unit no longer work with their former (i.e., released) teammates, it is likely that their performance will be uncertain (Huckman & Pisano, 2006). This finding is consistent with Reagans et al. (2005: 871), who maintain that the experience of other team members constitutes a "*pool of knowledge at an individual's disposal that is distinct from the knowledge he or she has accumulated directly*", and with Ethiraj and Garg (2012), who empirically find in the context of the National Basketball Association (NBA) that greater interaction among team members fosters learning, knowledge sharing and communication.

Therefore, when some teammates leave their former team, a subtraction process occurs such that the continuity of the team's functioning mechanisms is hampered, and its performance is likely to worsen. This subtraction of internal guideposts may engender a sense of uncertainty among current teammates, who no longer feel comfortable executing previously routinized tasks (Audia & Greve, 2006). As a result, the team as a whole might experience a lack of sense-making and orientation (Weick, 1993), which is frequently associated with negative performance (Edmondson et al., 2001).

However, the extant literature notwithstanding, we maintain that the release of co-specialized employees may also positively affect performance through its moderating effect on the relationship between team co-specialization and performance. More precisely, we argue that released employees' co-specialization may positively influence a firm's processes because it enables an organization to explore innovative paths and counter inertia.

The extant research has deeply investigated the role of inertia in the failure of firms threatened by discontinuous change (Hannan & Freeman, 1984; Henderson & Clark, 1990; Tripsas & Gavetti, 2000). Subsequent studies have addressed this issue from the perspective of routine adaptation to change (Pisano et al., 2001; Gilbert, 2005) and maintain that successful firms are those that add new competences and knowledge to their existing patterned and routinized set of procedures. In summary, the extant literature maintains that routines constitute a double-edged sword; on the one hand, they have positive effects because they are the coordinating mechanism of an organization (i.e., *the collective mind*: Weick & Roberts, 1993); on the other hand, routines represent both a source of inertia and of failure for incumbent firms confronting either competitive or technological discontinuities (Henderson & Clark, 1990; Tripsas & Gavetti, 2000).

Therefore, it seems relevant to investigate whether the partial or substantial release of routines may positively affect firms and their performance, which is also consistent with studies that espouse the beneficial effects of forgetting for a given organization (Levinthal & March, 1993; Pisano et al., 2001). However, the scholars that have empirically explored such phenomena (i.e., Gilbert, 2005; Tucker et al., 2007) have paid scant attention to the effect that the release of extant and redundant knowledge may have on the performance of the renewed unit. In particular, Gilbert (2005) emphasizes the mechanisms that enable routine relaxation, such as psychological safety; however, he does not adequately investigate whether a substantial release of current routines (i.e., routines associated with traditional media management) would help to address the threat represented by the internet to newspapers and the traditional media industry. Likewise, Tucker et al. (2007) examine the processes underlying effective best-practice transfers in neonatal intensive care settings, but they do not investigate whether the previous best practices were abandoned or maintained along with newly developed best practices.

Thus, to fill this void, we explore the role of released co-specialization as a type of enabling condition at the firm level, such that when (and the extent to which) a unit is deprived of existing routines, it is likely that it will produce *new* co-specialized knowledge. Previous research has found that routines are resistant to change (Edmondson et al., 2001; Gersick & Hackman, 1990); however, these studies have not investigated whether the release of a portion of an existing routine may prove beneficial to the performance of a new routine. We argue that this issue is quite salient because current routines may hamper the execution of new tasks. As reported by Edmondson et al. (2001: 687), "*The design of a commercial aircraft's cockpit is conducive to certain standard of operating procedures for take-off and landing. The strength of this correspondence can lull teams into executing well-known routines even when external stimuli vary. For example, accustomed to uniformly warm weather, an Air Florida pilot automatically responded in the affirmative to his team member's routine question,* 'Anti-ice off?'*, despite the heavy snowfall at Washington, D. C.'s National Airport during the January 1982 takeoff. Tragically, this inappropriate adherence to routine led to the flight's crash … killing all 74 crew members and passengers* (Gersick & Hackman, 1990). "

Therefore, we maintain that the release of co-specialized knowledge may have beneficial results for the development and execution of new routines because familiarity among team members frequently leads to the execution of behaviors in situations in which they are inappropriate or no longer adequate. Research on errors in medicine and other contexts reinforces this view (Edmondson et al., 2001; Reason, 1984).

Moreover, with regard to team members' experience, we also posit that current co-specialized knowledge and routines are only partially related to a unit member's age because individuals may join a given unit at a green age and work the for the unit for a given number of years before leaving the unit when he/she is still relatively young (according to the industry standard). In other words, our focus is not on the replacement of experienced individuals *per se*. This issue also invites further consideration regarding the inherent quality of *current* vs *new* routines. In particular, in this study, we are agnostic about the comparison between new and old routines on a purely observable quality basis. Our purpose is simply

to probe whether old routines – although valuable – are bound to be predictable by competitors such that, also because of inertia and ossification (Berman et al., 2002), they are not likely to contribute positively to performance beyond a certain point in time. Therefore, we endeavor to investigate whether their dismissal might be beneficial to the performance of the new routine.

In summary, we argue that when an organization is *lightened* from the redundancy and inertia of extant co-specialized knowledge, new processes can occur and new routines can develop. Thus, we maintain that enabling new resources, routines and procedures to create a positive effect on performance will be helped by a substantial *lightening process* regarding the release of prior resources, routines and procedures. In particular, this process will occur by releasing either a smaller or a more substantial portion of the co-specialized knowledge at the unit level. Therefore, we propose the following hypothesis:

Hypothesis 2. *The release of employees' co-specialization positively moderates the relationship between team co-specialization and performance.*

3. Methods

3.1. Settings

The Italian "Serie A" professional soccer league represents a competitive context that is similar to several business settings. In the Italian "Serie A", resource orchestration decisions regarding search/selection are carried out by a team's owner (*Presidente*). The owner sets the team's strategy: he hires the coach and selects a roster of players. The team's coach acts at a lower decisional level than the owner. The coach is in charge of training the players and is responsible for bundling the starting line-up, although he is not in charge of players' acquisition and release (Brera, 1975; Foot, 2007; Sconcerti, 2009). During the period covered by our research, a win accrued two points, a tie (or net) accrued one point and a loss accrued zero points. Because of the extreme popularity of and *endemic* passion for football across virtually every tier of Italian society (Brera, 1975; Foot, 2007; Sconcerti, 2009), leading a football club in the Italian "Serie A" is a highly demanding task. Furthermore, at the end of every season, there are many player trades among virtually all of the teams. In addition, daily widespread media coverage by three sports-dedicated newspapers (i.e., *Gazzetta dello Sport, Corriere dello Sport,* and *Tuttosport*) – in addition to the sports section of every national and regional newspaper – puts coaches, management and players under a magnifying glass. These features make the "Serie A" a highly appropriate setting for exploring our resource orchestration argument.

3.2. Sample and data

We collected data on a game-day basis between the 1960–61 and 1991-92 seasons. We gathered our data from two main sources: the "Enciclopedia Panini del Calcio Italiano, 1960–2000" and the "Almanacco Illustrato del Calcio" (years: 1960–1992). Both sources are published by Panini, which is widely considered to be the most authoritative and accurate source of information about Italian football. Additionally, we explored several issues from the 1960–1992 archives of *Gazzetta dello Sport*, which is the oldest and most widely distributed sports newspaper in Italy. We also interviewed several experts, and we explored the database of the Rec. Sport Soccer Statistics Foundation (RSSSF) database.

Our sample consists of data regarding players, coaches and team performances from the 1960–61 through the 1991-92 seasons. Because our unit of analysis is the football team, data on players and coaches are used to construct measures at the team level. Taking into account changes in the composition of the Serie A team list over the years (i.e., teams upgrade from and downgrade to Serie B during our sample period), there are a total of 43 teams in the dataset (Appendix A reports the complete list of the teams included in our research). In particular, from the 1960–61 through the 1966-67 seasons and from the 1988–89 through the 1991-92 seasons, 18 teams played in the Serie A, whereas from the 1967–68 through the 1987-88 seasons, only 16 teams played in the league. Therefore, our sample contains 534 team-year observations across 32 years (i.e., football seasons). Furthermore, the Italian Serie A league has no playoff rounds at the end of the season; thus, every year, several teams typically compete until the last game day not only for the final win for the championship but also for positions in the final standings that qualify for participation in the major European tournaments. In addition, because teams at the bottom of the standings (i.e., three or four, depending on the number of teams composing Serie A that year) are relegated to Serie B at the end of the year, a number of mid-to-low level teams struggle fiercely through the last game to avoid relegation. Therefore, as opposed to data collected in sports settings in which the final win is achieved through playoffs and in which many games at the end of the regular season are thus essentially useless, our dataset does not include many such useless games because team-to-team competition in Serie A remains alive for virtually every single football match until the final game day.

3.3. Variables

3.3.1. Dependent variable

3.3.1.1. Team performance. The dependent variable in our study is team performance, which is measured by mean points at the end of each season (the annual team data). Indeed, because a win was worth two points, a tie was worth one point, and a loss was worth zero points in the "Serie A" league during the time window of our research, we summed both wins and ties and divided this amount by the total number of games in the season. This measurement is similar to measures of performance utilized by other studies exploring sports settings (e.g., Berman et al., 2002; Holcomb et al., 2009). Previous research in sports settings has considered the ability to gain points in direct competition to be a highly qualified and straightforward measure of organizational performance (Berman et al., 2002; Holcomb et al., 2009; Sirmon et al., 2008).

3.3.2. Independent variables

3.3.2.1. New employees' experience. We calculated this variable as follows. First, we summed the games played in the careers by new players on the roster through the previous season. Subsequently, we divided this sum by the number of new players on the roster. Finally, we calculated the natural logarithm of this indicator.

3.3.3. New employees' experience squared

This variable is "New employees' experience" squared and allows for the investigation of the curvilinear relationship that we hypothesized.

3.3.4. Released employees' co-specialization

We adopt Reagans et al.'s (2005) measure for assessing co-specialization. For each pair of players on a team, we first consider the number of times that they have been bundled together in a given season. Next, we sum across pairs on a team that includes at least one released player and divide by team size. The formula is $\sum_{i=}^{R}\sum_{j=1}^{N} CKij/N(N-1)/2$. CK_{ij} is the number of times that player i (i.e., the released player) has been bundled with player j (whether that player was a released player or he remained on the team),

which we define as the co-specialized knowledge resources at the pair level, where R is the number of released players at the end of the season and N is team size. This measure gauges the amount of co-specialized knowledge developed during the previous season and then released at the beginning of the current season. Other studies have adopted this measure in the context of the software industry (Huckman et al., 2009) and the NBA (Ethiraj & Garg, 2012).

3.3.5. Team-level co-specialization

Similarly, we adopt Reagans et al.'s (2005) measure for team-level co-specialization. In particular, we assess how many times each pair of players has been bundled for a given game during the current season; the formula we use is $\sum_{i=1}^{N}\sum_{j=1}^{N} CKij/N(N-1)/2$. CK_{ij} is the number of times that player i has been bundled with player j, which we define as the co-specialized knowledge resources at the pair level; N is team size. Here, we compute the formula for all of the players on each roster, which allows us to calculate co-specialization among all players at the team level.

3.3.6. Control variables

3.3.6.1. Lagged team performance. This variable represents the previous year's team performance lagged to the current year.

3.3.7. Historic aspiration level

Following the procedure adopted by the performance feedback literature, we constructed each team's historic aspiration level (HAL). In particular, by using the final rank at the end of a given season, we constructed the exponential weighted moving average employed by Levinthal and March (1981): $HAL_t = \alpha\ Final\ Rank_{t-1} + (1-\alpha)\ HAL_{t-1}$, with t indicating football seasons. Following the extant literature, we constructed this variable with values of α set at 0.25, 0.50, and 0.75 (Moliterno et al., 2014). We opted for $\alpha = 0.25$ because it had the best fit throughout our models and also because a small value of α has face validity in the context of our study, as we do not wish to overemphasize the most recent occurrences in the context of choices concerning knowledge resource selection and release.

3.3.8. Team quality

To gauge this variable, we begin by considering the quality of a team's players at the individual level (i.e., at the single-player level). First, we count the number of games played by a given player during each season, then we multiply that amount by the team's total points at the end of that season, and finally, we divide that number by the player's age. Subsequently, we calculated the average player quality for the whole "Serie A" league; finally, we counted for each team the number of players whose quality result was above the "Serie A" average. We provide the rationale for this measure in the following. Because Italian football is a tremendously selective and competitive setting, it is difficult for a "Serie A" player to be in the starting lineup continuously (Brera, 1975; Sconcerti, 2009). Therefore, a player who plays a high number of games per season is a highly qualified professional player. Furthermore, drawing on studies addressing the contribution of human capital to performance, which take into account work experience weighted by the quality of the employer and other features of human capital (Huckman & Pisano, 2006; Ployhart & Moliterno, 2011), a player on a "Serie A" top-ranked team must be considered of higher quality compared with a player on a lower-level team. Finally, we consider that even the quality of highly qualified players decreases due to age. We count this value per year, not including the current season. In addition, we carried out validation procedures. We apply this measure to gauge the quality of each new player, and then we calculate the mean value of the new players' quality. To validate our measure, we explored bibliographic sources (Brera, 1975; Foot, 2007; Sconcerti, 2009) and sports newspaper archives (*Gazzetta dello Sport*): their reports are consistent with our results and confirm that our ranking of football players is an accurate ranking of the best athletes in the time window of our research, especially with regard to the top players in our quality ranking (Appendix B). For example, Gianni Rivera (#1 in our ranking) was the first Italian player to win the Golden Football as the best European player, in 1969. Giacinto Facchetti (#2 in our ranking) and Tarcisio Burgnich (#3 in our ranking) were, in the time window of our research, by far the best pair of *terzini* (side-backs). Dino Zoff (#5 in our ranking) is considered one the best goalkeepers in the history of world football, not only of Italian football. Mario Corso (#4 in our ranking) and Sandro Mazzola (#6 in our ranking) were the leading forwards of the *Grande Inter* (Great Inter), a team that dominated Italian and European Football in the 1960s. Furthermore, our ranking is highly correlated with the ranking of the presence on Italy's national team for the time window of our research, which constitutes a very compelling corroboration of our measure, given that only the best players have the chance to be selected for the national team. In Appendix B, we provide an example of how this variable was calculated and report the validation procedures.

3.3.9. Released employees' quality

This variable is calculated following the procedure that is reported above for the variable "Employees' quality", but it only refers to the mean quality of released players, i.e., those players who were dismissed at the end of the previous season.

3.3.10. New coach

This is a dummy variable and takes the value of "1" if a given team in our dataset hired a new coach for that season and "0" otherwise.

3.3.11. Coach's absolute experience

This variable is the total number of seasons that a given coach has been in the "Serie A" league.

3.4. Model specification

We employed panel data analysis to test our hypotheses. The observation unit is the team-year. In our sample, we have data from 1960 to 1992, for a total of 32 years (seasons) and 43 teams. By exploiting the longitudinal nature of the data (both time series and cross section), we control for both unobserved heterogeneity and the impact of lagged dependent variables.

3.4.1. Panel model specification

We include team fixed effects that control for time-invariant omitted variables at the level of each sporting team (for example, location and date of incorporation, among many others). We also need to control for time dummies to account for common effects to all teams in a specific year. We test the ideal lag structure and decided to opt for two lags of the dependent variable as a predicting variable on the right-hand side to account for a very well-known effect of persistent team performance over time (years): a strong (weak) team in one year tends to be strong (weak) in later years. In addition, we add ten weakly exogenous regressors to test our hypotheses. However, because endogeneity is also a potential concern for these regressors (for example, the average quality of a team could be determined by its results in previous years), the independent variables (x^1 to x^{10}) are lagged, which implies that those independent variables are at least not determined simultaneously with the dependent variable. The baseline model is therefore specified as follows:

$$y_{i,t} = \alpha + \delta y_{i,t-1} + \pi y_{i,t-2} + \beta_1 x^1_{i,t-1} + \beta_2 x^2_{i,t-1} + \beta_3 x^3_{i,t-1} + \beta_4 x^4_{i,t-1} + \beta_5 x^5_{i,t-1} + \beta_6 x^6_{i,t-1} + \beta_7 x^7_{i,t-1} + \beta_8 x^8_{i,t-1} + \beta_9 x^9_{i,t-1} + \beta_{10} x^{10}_{i,t-1} + v_i + n_t + \varepsilon_{i,t}$$

where y_{it} is the dependent variable, i.e., the average number of points during a year, $x^1_{i,t-1}$ is the dummy for a new coach, $x^2_{i,t-1}$ is the coach's absolute experience in the "Serie" A football league, $x^3_{i,t-1}$ is the historic aspiration level, $x^4_{i,t-1}$ is team quality, $x^5_{i,t-1}$ is the average quality of released players, $x^6_{i,t-1}$ is the experience of new employees, $x^7_{i,t-1}$ is the square of new employees' experience, $x^8_{i,t-1}$ is released employees' co-specialization, $x^9_{i,t-1}$ is team-level co-specialization, $x^{10}_{i,t-1}$ is the interaction between released employees' co-specialization and team-level co-specialization, v_i is team fixed effects, n_t are time dummies and finally, $\varepsilon_{i,t}$ is the error term.

To ascertain whether team effects are random or fixed, preliminarily, we run a Durbin-Wu-Hausman test (Hausman specification test), which allows us to confirm the need for fixed effects (vis-à-vis random effects) at the team level. Furthermore, to correct for heteroskedasticity and autocorrelation, we cluster the standard errors (Stock & Watson, 2003). This procedure is based on the concept of the cluster-robust covariance matrix (VCE command in STATA), which relaxes the assumption of independent errors and allows for correlation between errors within clusters of obse. Thus, this procedure specifies that the standard errors allow for intragroup/cluster correlation, and it relaxes the usual requirement that the observations must be independent within teams. In other words, the observations are independent across groups (clusters), but not necessarily within groups. Table 2 reports the results of this model.

3.4.2. GMM panel model specification as a system

When introducing two lagged dependent variables in the previous panel model, we had to account for the fact that $y_{i,t-1 \text{ and } } y_{i,t-2}$ are correlated with the error term. For this reason, the estimated coefficients (Table 2) might be biased due to endogeneity. For a robustness check, we re-run the entire set of regressions in a dynamic panel data setting. Specifically, we use a Generalized Method of Moments (GMM) model (STATA xtabond2) to mitigate the potential endogeneity problem. More precisely, the GMM model is a system of equations specified in the following way:

$$\Delta y_{i,t} = \delta \Delta y_{i,t-1} + \pi \Delta y_{i,t-2} + \beta_1 \Delta x^1_{i,t-1} + \beta_2 \Delta x^2_{i,t-1} + \beta_3 \Delta x^3_{i,t-1} + \beta_4 \Delta x^4_{i,t-1} + \beta_5 \Delta x^5_{i,t-1} + \beta_6 \Delta x^6_{i,t-1} + \beta_7 \Delta x^7_{i,t-1} + \beta_8 \Delta x^8_{i,t-1} + \beta_9 \Delta x^9_{i,t-1} + \beta_{10} \Delta x^{10}_{i,t-1} + n_t + \varepsilon_{i,t}$$

$$y_{i,t} = \alpha + \delta y_{i,t-1} + \pi y_{i,t-2} + \beta_1 x^1_{i,t-1} + \beta_2 x^2_{i,t-1} + \beta_3 x^3_{i,t-1} + \beta_4 x^4_{i,t-1} + \beta_5 x^5_{i,t-1} + \beta_6 x^6_{i,t-1} + \beta_7 x^7_{i,t-1} + \beta_8 x^8_{i,t-1} + \beta_9 x^9_{i,t-1} + \beta_{10} x^{10}_{i,t-1} + v_i + n_t + \varepsilon_{i,t}$$

The GMM "difference equation" controls for unobserved heterogeneity (the v_i are cancelled out), and the level equation corrects for endogeneity and improves the efficiency by exploiting the instruments for the two lagged variables. Table 3 reports the results of this model accounting for endogeneity.

4. Results

Table 1 reports the descriptive statistics and the correlation analysis. Table 2 (Models 1–4) presents the results of the regression analysis. Table 3 (Models 1–4) presents the results of the regression dynamic panel data analysis controlling for endogeneity.

Model 1 reports a baseline with controls. First, we tested Hypothesis 1, which proposes a curvilinear relationship between the experience of new knowledge resources (i.e., new employees) and performance. Model 2 tested the full model for our first hypothesis. Our findings support Hypothesis 1 because the impact of employees' experience on performance is shown to be non-monotonic and significant (Model 2, Table 2: *New employees' mean experience:* $b = -0.126$, $p < 0.05$; and *New employees' mean experience squared*: $b = 0.0254$, $p < 0.001$). To appraise the actual shape of the hypothesized relationship (that is, whether our findings supported a U-shaped relationship, or, instead, just a non-linear decreasing effect), we conducted a further analysis on the non-monotonic function that allowed us to confirm Hypothesis 1. Our additional analysis supported the actual U-shaped relationship between "New employees' mean experience" and performance.

More precisely, to investigate this relationship, we examine the first-order partial derivatives of performance with respect to new employees' mean experience (Model 2, Table 2). Subsequently, we set the equation equal to zero and solved for new employees' mean experience.

Then, we have:

Model 2: Team Performance = 0.514−0.126 new employees' experience + 0.0254 new employees' experience squared.

Because new employees' experience is the natural of the new employees' mean experience, to solve the equation, we set new employees' experience = Z and new employees' experience squared = Z^2

Thus, *Model 2: Team Performance* = 0.514−0.126 Z + 0.0254 Z^2

Model *2: ∂Performance/∂Z = 2*0.0254 *Z-0.126 = 0; thus, Z = 2.48*

This value (i.e., *2.48*) represents the point beyond which an increasing effect of new employees' experience on performance actually occurs. It is comprised within the range of our observations (Table 1), as the value of new employees' mean experience varies between −1.79 (min) and 5.30 (max), with the mean value equal to 3.31 and the standard deviation equal to 0.94. Thus, we found support for our Hypothesis 1. More precisely, an increase in the value of the experience of new employees negatively affects performance up to a value equal to 2.48, and beyond this value, an increase in the value of new employees' mean experience positively affects performance. Taking into account that the value is the natural logarithm of new employees' mean experience, we calculate the inverse function:

New employees' experience = e^Z=> New employees' experience = $e^{2.48} = 11.94$

Thus, we can argue that because this variable varies between 0 (min) and 200.3333 (max), with a mean value equal to 35.83762 and a standard deviation equal to 28.7041, the value 11.94 is the point beyond which we observed an increasing effect of the variable and a non-monotonic, i.e., U-shaped, relationship. More precisely, we observed that approximately 21.39% of our observations are in the downward portion of the parabola, while the remaining portion of the observations are on the upward side of the parabola.

This finding allows us to observe that the contribution of new knowledge resources to performance must be observed by considering such resources as a whole and not as if they were stand-alone assets. Furthermore, it allows us to appraise the impact of orchestration on performance because we empirically gauged that the experience of newcomers affects performance through a non-monotonic relationship (i.e., U-shaped), which implies that a manager must pay attention not only to the experience of the individual knowledge resources that he is acquiring but also to the collective experience that he is bringing into the unit; importantly,

Table 1
Descriptive statistics & correlations.

	Mean	S.D.	Min	Max	1	2	3	4	5	6	7	8	9	10
Performance	1.00	0.26	0.40	1.71										
Lagged performance	1.07	0.22	0.67	1.71	0.618 (0.000)									
New coach	0.59	0.49	0.00	1.00	−0.282 (0.000)	−0.332 (0.000)								
Coach's absolute experience	4.77	4.22	1.00	23.00	0.153 (0.000)	0.119 (0.015)	−0.186 (0.000)							
Historic aspiration level	−7.70	3.34	−15.75	−1.00	0.669 (0.000)	0.800 (0.000)	−0.154 (0.002)	0.180 (0.000)						
Team quality	7.00	3.88	0.00	15.00	0.508 (0.000)	0.589 (0.000)	−0.345 (0.000)	0.234 (0.000)	0.608 (0.000)					
Released employees' quality	84.72	65.47	0.00	375.89	0.255 (0.000)	0.287 (0.000)	−0.035 (0.474)	0.201 (0.000)	0.410 (0.000)	0.198 (0.000)				
New employees' experience	3.31	0.94	−1.79	5.30	0.163 (0.000)	0.045 (0.369)	−0.038 (0.390)	0.225 (0.000)	0.127 (0.011)	0.366 (0.000)	0.185 (0.000)			
New employees' experience squared	11.82	5.40	0.00	28.09	0.220 (0.000)	0.070 (0.160)	−0.053 (0.238)	0.237 (0.000)	0.140 (0.005)	0.392 (0.000)	0.205 (0.000)	0.955 (0.000)		
Released employees' co-specialization	7.42	5.03	0.09	35.76	−0.354 (0.000)	−0.399 (0.000)	0.313 (0.000)	−0.115 (0.010)	−0.300 (0.000)	−0.517 (0.000)	0.001 (0.980)	−0.033 (0.472)	−0.054 (0.238)	
Team-level co-specialization	22.31	5.34	6.28	41.22	0.360 (0.000)	0.215 (0.000)	−0.097 (0.025)	0.158 (0.000)	0.202 (0.000)	0.033 (0.453)	0.105 (0.031)	0.134 (0.003)	0.179 (0.000)	0.069 (0.127)

Table 2
Results of panel data regression.

	(1) Performance	(2) Performance	(3) Performance	(4) Performance
Lagged performance	0.320** (0.107)	0.364** (0.130)	0.267* (0.108)	0.299* (0.122)
Two-year lagged performance	0.225** (0.0671)	0.245*** (0.0660)	0.156** (0.0566)	0.169** (0.0555)
New coach	−0.0357 (0.0242)	−0.0349 (0.0241)	−0.0303 (0.0247)	−0.0278 (0.0245)
Coach's absolute experience	−0.00251 (0.00306)	−0.00254 (0.00299)	−0.00303 (0.00323)	−0.00289 (0.00316)
Historic aspiration level	−0.0244+ (0.0139)	−0.0231 (0.0145)	−0.0239+ (0.0122)	−0.0239+ (0.0123)
Team quality	0.00301 (0.00551)	−0.00434 (0.00718)	0.00514 (0.00431)	0.00189 (0.00599)
Released employees' quality	−0.000362+ (0.000207)	−0.000343 (0.000216)	−0.000160 (0.000160)	−0.000157 (0.000165)
New employees' experience		−0.126** (0.0397)		−0.0967** (0.0338)
New employees' experience squared		0.0254*** (0.00658)		0.0169* (0.00629)
Released employees' co-specialization			−0.0235* (0.01000)	−0.0265* (0.0107)
Team-level co-specialization			0.0100* (0.00488)	0.00781 (0.00511)
Released employees' co-specialization * Team-level co-specialization			0.000834+ (0.000470)	0.000943+ (0.000484)
_cons	0.358 (0.243)	0.514+ (0.282)	0.313 (0.222)	0.475+ (0.246)
R^2	0.180	0.222	0.302	0.317
N	346	335	346	335

$^{+}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.
Robust standard errors in parentheses.
Results for year dummy variables are available upon request.

it is this collective level of expertise that will be added to the given unit. By empirically observing a non-monotonic relationship (i.e., U-shaped) between newcomers' experience and performance, we thus illustrate how orchestration choices affect a firm's results. More precisely, our study suggests that such choices are successful when they bring a clear choice into the unit in terms of a substantial new amount of experience through the newly acquired players. This evidence represents a fruitful contribution to the resource orchestration literature because, in contrast to both studies that emphasize the relevance of individual experience (Coff, 1999; Huckman et al., 2009) and those that maintain different effects for high and low levels of experience on performance (Huckman et al., 2009; Lepak & Snell, 1999; Reagans et al., 2005), we find that only a substantial level of experience (i.e., beyond a given amount, as maintained by the U-shaped relationship) among newcomers can positively affect performance.

Table 3
Results of the dynamic panel data analysis controlling for endogeneity.

	(1) Performance	(2) Performance	(3) Performance	(4) Performance
Lagged performance	−0.00519	0.0634	0.0313	−0.0204
	(0.137)	(0.172)	(0.135)	(0.169)
Two-year lagged performance	0.197*	0.199+	0.112	0.0814
	(0.0870)	(0.104)	(0.0810)	(0.0908)
New coach	−0.0347	−0.0403+	−0.0374	−0.0433
	(0.0247)	(0.0235)	(0.0249)	(0.0266)
Coach's absolute experience	−0.00173	−0.00106	−0.00500	−0.00273
	(0.00710)	(0.00759)	(0.00605)	(0.00675)
Historic aspiration level	0.0585**	0.0504*	0.0189	0.0228
	(0.0201)	(0.0251)	(0.0234)	(0.0272)
Team quality	−0.00373	−0.0131	0.0172	0.0140
	(0.0107)	(0.0105)	(0.0129)	(0.0118)
Released employees' quality	−0.000515+	−0.000318	0.0000632	0.000124
	(0.000263)	(0.000295)	(0.000322)	(0.000362)
New employees' experience		−0.191**		−0.116
		(0.0694)		(0.0747)
New employees' experience squared		0.0428**		0.0220
		(0.0150)		(0.0153)
Released employees' co-specialization			−0.0421*	−0.0396*
			(0.0187)	(0.0197)
Team-level co-specialization			0.00671	0.00645
			(0.00675)	(0.00670)
Released employees' co-specialization * Team-level co-specialization			0.00151+	0.00131
			(0.000885)	(0.000913)
_cons	1.412***	1.403**	0.870*	1.123*
	(0.375)	(0.489)	(0.409)	(0.502)
N	346	335	346	335

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
Robust standard errors in parentheses.
Tests available upon request.

Hypothesis 2 predicted that the release of employees' co-specialization would positively moderate the relationship between a team's co-specialization and its performance and that the relationship would become stronger when the *release* of employees' co-specialization was higher. The interaction between the release of employees' co-specialization and a team's co-specialization was shown to be significant (Model 3, Table 2: $b = 0.000834$, $p < 0.1$). However, the value of the coefficient was not very high; therefore, we can conclude that we observed a positive and significant result, although at a lower level. In particular, this finding addresses the subtraction of co-specialization from a given unit. Although the extant literature has noted the relevance of knowledge resource co-specialization and its positive effect on performance (Huckman et al., 2009; Huesch, 2013; Reagans et al., 2005), it has not probed the opposite relationship — specifically, what occurs when co-specialization is subtracted from a given unit. However, we found that, conversely, the release of co-specialized employees has a positive effect on performance; in particular, we observed that the release of co-specialized employees positively moderates the relationship between team co-specialization and performance. Furthermore, this finding is quite relevant because the extant literature (i.e., Gilbert, 2005; Tucker et al., 2007) has almost completely neglected the role played by subtracting old routines in the performance of new routines. Indeed, by observing the positive moderating effect of released players' co-specialization on the relationship between team co-specialization and performance, we observed that a given unit requires a *lightening* of the burden of previous learning before it can effectively exploit its new knowledge. This result is insightful because it reports the fruitful interplay between different resource orchestration decisions (i.e., between the release of co-specialization and the newly acquired co-specialized resources). More precisely, we observed that the dismissal of *old* routines is beneficial to the development of *new* routines. In other words, before new insight and knowledge can fruitfully be exploited, a firm must be relieved of the burden of redundant and less useful knowledge represented by old-timers' co-specialization.

Finally, to corroborate our results, we conducted further analyses to rule out potential endogenous relationships. Table 3 reports the results corrected for endogeneity.

To this end, we have specified a two lags dynamic panel model via a GMM estimation model (Baum, Schaffer, & Stillman, 2003), and we do find confirmation for both Hypothesis 1 (Model 2, Table 3) and Hypothesis 2 (Model 3, Table 3). To assess the validity of our GMM estimation, we run diagnostic tests for the following:

(1) the presence of first-order autocorrelation AR (1): we correctly reject the null and confidently exclude the presence of first-order autocorrelation;
(2) the presence of second-order autocorrelation AR (2): we cannot reject the null, and we find the presence of second-order autocorrelation (as per construction in GMM);
(3) the Hansen test on over-identifying restrictions: we cannot reject the null hypothesis that the over-identifying restrictions are valid; therefore, we conclude that the estimates corrected for endogeneity are valid.

We therefore conclude that the results of our dynamic model are robust, and our main and foremost hypotheses are indeed confirmed.

5. Discussion

The foregoing results paint an interesting picture regarding the consequences of resource orchestration decisions on firm performance. In particular, we observed that newcomers' experience affects firm performance through a curvilinear (i.e., U-shaped) relationship — as demonstrated by the empirical support provided

for Hypothesis 1 – and that the release of co-specialized employees has a positive moderating effect on the relationship between team co-specialization and performance, as evidenced by the empirical support offered for Hypothesis 2. On the basis of these findings, our study makes several contributions and opens up interesting directions for future research.

First, we provide an insightful contribution to the resource orchestration literature (Helfat et al., 2007; Sirmon et al., 2011). More precisely, on the basis of our first finding, we argue that a given manager should be able to orchestrate new knowledge resource acquisition at the unit level and select the most appropriate level of newcomer acquisition depending on their experience. This finding further contributes to the literature on resource orchestration, particularly regarding resource complementarity (Crocker & Eckardt, 2014; Ehtiraj & Garg, 2012), by empirically showing the types of resources that are appropriate to acquire at the firm level and by theoretically maintaining that effective complementarity can be designed. Furthermore, with respect to the collective dimension of resource utilization, our findings address a specific research void in the resource orchestration and configuration literature (Helfat et al., 2007) because we have empirically observed what types of resources must be dismissed and what other resources must be recruited to orchestrate a successful resource configuration. Thus, we empirically showed how effective complementarity can be designed and, subsequently, achieved.

Our second contribution addresses the need for further research efforts suggested by studies on human capital combination. Indeed, the decision to release co-specialized players, although it may exert a negative direct effect on performance, is also amenable to producing an indirect positive effect. Therefore, a manager who has a mid-to-long-term orientation regarding the unit's results must account for this possibility, given that he must be interested in the team's current results, but not to the detriment of the unit's future survival. We argue that this finding also positively contributes to the development of research on resource orchestration. Additionally, by addressing the double effect of the release of co-specialized employees, we have also explored some issues raised in the collective turnover literature (Hausknecht and Trevor, 2011; Nyberg & Ployhart, 2013). More precisely, by empirically observing that the substitution of a group of *veterans* positively moderates the relationship between a team's current resource bundle and performance, we address a critical issue from both the orchestration and the collective turnover literature because we have clarified that resource orchestration can be extended to resource divestment, not only with respect to single resources but also regarding the replacement of a bundle of resources.

Our study also opens up a fruitful dialogue with other streams of literature for potential research extensions. One of these streams concerns the Leader-Member exchange (LMX) literature (Foa & Foa, 1974; Schwind Wilson, Sin, & Conlon, 2010). More precisely, it would be quite relevant to assess whether the substitution of leading players (i.e., a leading team member) affects resource exchanges and, in turn, firms' performance. Although this extension would redirect research toward the relevance of individual knowledge resources, whereas our study aims instead to emphasize collective knowledge resources, it would nonetheless be important to control for this effect on both resource exchanges and firms' results. We argue that the cross-contamination between the resource orchestration and LMX theories would enrich managerial decision making, especially with regard to the exploitation of valuable knowledge resources, both at the individual and collective levels.

Another intriguing extension concerns the Institutional Entrepreneurship literature (DiMaggio, 1988; Greenwood & Suddaby, 2006). More precisely, by observing how leading firms/teams contribute to changing extant knowledge resource practices and rules in their industry/setting, we could observe how resource orchestration contributes to redefining and redesigning *the rules of the game*. For example, in the context of several major European football leagues, some teams such as the Spain's Real Madrid and Barcelona, England's Manchester United, Manchester City and Chelsea and Germany's Bayern Munchen heavily invested in high-quality and experienced players to increase their financial returns from both game tickets and merchandising, thus impairing competitors and gaining a sustainable competitive advantage (Szymanski, 2015). From the viewpoint of the dialogue between resource orchestration and institutional entrepreneurship, it is particularly relevant to consider how this *new* resource strategy affected not only the leagues in which these teams compete but the whole European football environment, given that the leading European institution for football, UEFA (Union of European Football Associations), recently implemented a regulation for teams whose spending budget substantially exceeded their revenue (i.e., the so called Financial Fair Play regulations). It would therefore be interesting to extend the resource orchestration insights in the direction of institutional entrepreneurship to assess whether resource acquisition and divestment strategies influence changes in the rules of the game.

6. Conclusion

Our study provided a number of fruitful insights with regard to resource orchestration. In particular, we find that managers must pay attention to the collective experience of the knowledge resources that they bring into a given unit. In addition, we find that although the release of old routines may negatively (and directly) affect performance, it can also positively (and indirectly) affect the performance of new routines. More precisely, with regard to our first finding, the U-shaped relationship suggests at least two implications for managers who are interested in human capital management. One implication concerns the contribution of knowledge resources as a whole and not only as the sum of individual resources. The second implication refers to the need to renew the human capital endowment at the firm level while paying attention to the experience of the newly acquired resources. Therefore, it is important to select and recruit newcomers characterized by substantial experience so that these knowledge resources can contribute to the firm's results in the shortest time possible. Furthermore, with regard to the release of co-specialized knowledge resources, our second finding suggests that the dismissed knowledge can be effectively substituted by new routines because such routines are amenable to working better when they are lightened from the burden of prior routines.

Our study also has some implications for theory as well as for managerial practice. First, our study clarifies that when new knowledge resources must be added to a given unit, the receiving unit (i.e., a firm, a team, a division, and so on) should not be hindered by uncertainty with regard to the contribution of the newcomers, who must be experienced, whose professional background must be well known and whose competencies should be clearly recognizable. For example, in the context of a either a department or a research center, newcomers' competencies will be effectively deployed and exploited if their previous work and publications allow a clear understanding of their skills. In other words, the greater the experience of newcomers is upon joining a new team, the lower the uncertainty that will characterize their utilization in the context of their new unit/firm. Future studies should investigate how previous skills and knowledge affect performance in settings characterized by frequent employee turnover.

In contrast, with regard to the positive moderating effect of the release of co-specialized resources on the performance of current knowledge resources, we maintain that such a renewal is not only necessary at a given point in time but that it is also beneficial for a given team. More precisely, we argue that managers must make decisions that are consistent with the purpose of preserving a firm's competitive advantage. Unfortunately, it is sometimes necessary for current knowledge resources to leave a unit/firm to allow for new knowledge resource development. However, although the loss of current co-specialized knowledge can damage a firm, in a parallel fashion, it may also help a firm develop new and less predictable competencies, thus creating an overall positive effect for the firm. Future studies should investigate how and to what extent this type of replacement can engender positive results under different environmental and competitive contingencies; for example, it should be investigated whether routine replacement would exert the same effect in emerging industries as in mature sectors.

In terms of managerial implications, we surmise that when managers must cope with the necessity of replacing current assets and resources, they should make clear choices and avoid compromise despite the possible fear of being perceived as too radical of a renovator. Indeed, if renewal is not implemented to an adequate extent, the positive effect of new knowledge resources on performance can be hindered and their possible contribution can remain uncertain. The most appropriate managerial implication, therefore, is to exploit assets and resources to achieve their best potential performance before they begin to show a decreasing performance trend due to inertia and predictability. Subsequently, we suggest replacing such resources neatly and quickly through the recruitment of experienced knowledge resources to preserve competitiveness and at the same time renew the firm's creativity and innovativeness.

Finally, our study also provides a methodological contribution, especially with respect to the analysis of potential sources of endogeneity. In particular, we have ruled out several sources of endogeneity via a GMM estimation model (Baum et al., 2003), through which we have provided further corroboration of our research hypotheses.

Obviously, our study is not without limitations; however, we argue that those limitations represent useful directions for future research. A major limitation involves the generalizability of our findings to settings that are different from sports. In fact, managerial studies increasingly rely on sports settings to collect data and evidence whose implications are subsequently extended to business contexts (see Day et al., 2012; Wolfe et al., 2005). Nevertheless, we maintain that further contributions to the generalizability of sports-based research could include extensions to contexts that are based on loose coordination among colleagues (such as professional consulting firms or law firms) rather than contexts based only on tight collaboration among teammates. Extensions to settings where the contribution of individuals to a team is deemed to be more relevant than the aggregate level of knowledge of the individuals would provide corroborating evidence of our findings. More precisely, it would be interesting to investigate whether resource orchestration is also statistically and substantially significant in contexts where *the sum* of the available resources is as relevant as the *whole bundle* of such resources because such settings could demonstrate even greater significance of resource orchestration (i.e., managerial decision making), especially with respect to resource acquisition and release. Another limitation of our study is represented by the limited amount of information available for the individuals included in our data set. Further research, including other data about the knowledge resources that are the subjects of our investigation, might further corroborate and extend our insights.

In summary, our study clarified that resource orchestration can affect firms' performance to a substantial extent; therefore, we argue that subsequent research can address the implications suggested by our findings.

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Appendix A. List of football teams included in the dataset

1. Ascoli; 2. Atalanta; 3. Avellino; 4. Bari; 5. Bologna; 6. Brescia; 7. Cagliari; 8. Catania; 9. Catanzaro; 10. Cesena; 11. Como; 12. Cremonese; 13. Empoli; 14. Fiorentina; 15. Foggia; 16. Genoa; 17. Internazionale; 18. Juventus; 19. L.R. Vicenza; 20. Lazio; 21. Lecce; 22. Lecco; 23. Mantova; 24. Messina; 25. Milan; 26. Modena; 27. Napoli; 28. Padova; 29. Palermo; 30. Parma; 31. Perugia; 32. Pescara; 33. Pisa; 34. Pistoiese; 35. Roma; 36. Sampdoria; 37. Spal; 38. Ternana; 39. Torino; 40. Udinese; 41. Varese; 42. Venezia; 43. Verona.

Appendix B. Sample calculation of individual and team quality

Individual player quality

$$\sum_{t=1}^{N-1} \frac{(number\ of\ matches\ played\ )_{t-1} \times (\text{team's total points}\ )_{t-1}}{age_{t-1}}$$

We calculate *new employees' quality* at the team level as the average of the individual quality for the new players on each team at the end of the previous season to attenuate reverse causality.

Example

In this example, we calculate *new employees' quality* for the team *Roma* in the 1979–80 season. Suppose – for the sake of the example – that Roma's orchestration strategy consists of three new players, A, B, and C, who, before joining Roma, played in Serie A in the amounts reported below.

Because Roma decided to acquire players A, B, and C, its *new employees' quality* equals $(142.84 + 102.36 + 25)/3 = 270.2$.

By using this approach to measure individual player quality, we obtain the following highest ranked 30 players over the time window of our study (i.e., between the 1960–61 and 1991–92 seasons).

To further validate our measure, as a proxy for players' quality, we also counted the number of games played (caps) with Italy's national team during the time span of our study. Taking into account the role of specialization, i.e., only one player per single role can be bundled in the starting lineup, and considering that the national team plays only a few games per year, the overall national team game-presence ranking is consistent with the above reported quality ranking (data available from the authors upon request).

We find only a few exceptions to our results that are associated with highly skilled players who either had a shorter career (i.e., a lower number of games played) or who spent part of their career with lower-level teams. Included among these players are Paolo

Player	Season	Team	Number of matches played	Team's points at the end of the season	Age
A	1975–76	Fiorentina	30	27	24
	1976–77	Fiorentina	25	35	25
	1977–78	Milan	20	37	26
	1978–79	Milan	28	44	27
B	1976–77	Napoli	28	28	18
	1977–78	Napoli	30	19	19
	1978–79	Bologna	24	24	20
C	1978–79	Verona	30	15	18

Individual quality of player A: [(30*27/24) + (25*35/25) + (20*37/26) + (28*44/27)] = 142.84.
Individual quality of player B: [(28*28/18) + (30*19/19) + (24*24/20)] = 102,36.
Individual quality of player C: (30*15/18) = 25.

1. RIVERA Gianni (M)	11. CAUSIO Franco (F)	21. MORINI Francesco (D)
2. FACCHETTI Giacinto (D)	12. ALTAFINI Jose' (F)	22. CUCCUREDDU Ant. (D)
3. BURGNICH Tarcisio (D)	13. GALLI Giovanni (G)	23. PULICI Paolino (F)
4. CORSO Mario (F)	14. ROSATO Roberto (D)	24. BETTEGA Roberto (F)
5. ZOFF Dino (G)	15. FURINO Giuseppe (M)	25. GUARNERI Aristide (D)
6. MAZZOLA Sandro (F)	16. BERGOMI Giuseppe (D)	26. FERRINI Giorgio (D)
7. ALBERTOSI Enrico (G)	17. BULGARELLI Giac. (M)	27. DOMENGHINI Angelo (F)
8. DE SISTI Giancarlo (M)	18. BARESI Franco (D)	28. VIERI Lido (G)
9. SCIREA Gaetano (D)	19. PECCI Eraldo (M)	29. ANASTASI Pietro (F)
10. SALVADORE Sandro (D)	20. GENTILE Claudio (D)	30. LODETTI Giovanni (M)

G = goalkeeper; D = defender; M = midfielder; F = forward.

Rossi, who played in Serie A for only 8 years because of knee injuries and a 2-year ban due to an illegal betting scandal and who spent the first half of his career with minor teams such as Como, Vicenza and Perugia; and Gigi Riva, who had two major leg injuries, and who also spent his entire career with Cagliari, a minor team, which, nevertheless, he led to the Serie A championship in 1969–70.

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