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Resource orchestration of firm-specific human capital and firm performance—the role of collaborative human resource management and entrepreneurial orientation

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ABSTRACT

Firm-specific human capital (HC) is widely recognised as the most important resource for superior firm performance. Contemporary literature on the resource-based view (RBV) and resource orchestration has stressed the importance of organising resources, such as firm-specific HC, in order to fully exploit them. However, companies with idiosyncratic resources cannot rely on established resource exploitation practices, making the exploitation of firm-specific HC a complex issue. Nevertheless, few studies have empirically examined how to orchestrate firm-specific HC. Therefore, the aim of this study is to examine how resource orchestration—operationalised as collaborative human resource management (CHRM) and entrepreneurial orientation (EO) both individually and combined—moderates the relationship between firm-specific HC and firm performance. Based on a sample of 151 Swedish manufacturing firms, the findings demonstrate that CHRM and EO do not independently influence the relationship between firm-specific HC and performance. However, firms with firm-specific HC benefit from either being highly entrepreneurial and relying on CHRM *or* being non-entrepreneurial and not focusing on CHRM; they perform worst if they are entrepreneurial without using CHRM. Whereas previous RBV-studies on resource exploitation have mainly stressed that HC *has to* be exploited, this study contributes to the RBV by examining *how* firm-specific HC *should be* exploited.

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Human capital; resource-based view; resource management; resource orchestration; entrepreneurial orientation; firm-specific human capital

Introduction

Human capital (HC) (Becker, 1962, 1964) has emerged to become a key concept in the strategic human resource management literature (Chadwick, 2017; Richard & Johnson, 2001; Wright, McMahan, &

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McWilliams, 1994). In contrast to general HC, firm-specific HC concerns the skills of employees that are specialised and applicable to a particular firm (Lepak & Snell, 2002). Moreover, the idiosyncratic nature of firm-specific HC reduces employees' bargaining power, making it less likely for the value, generated by firm-specific HC, to be appropriated by employees in terms of increased wages (Bowman & Swart, 2007; Coff, 1999). Thus, by mainly drawing on the resource-based view (RBV) of the firm (Barney, 1991; Wernerfelt, 1984), numerous scholars have argued that firm-specific HC is a valuable, rare and imperfectly imitable resource that enables firms to outperform their competitors (Hitt, Biermant, Shimizu, & Kochhar, 2001; Nyberg, Moliterno, Hale, & Lepak, 2014; Ployhart, Nyberg, Reilly, & Maltarich, 2014); a notion strongly supported by the extensive meta-analysis on the relationship between HC and firm performance (Crook, Todd, Combs, Woehr, & Ketchen, 2011).

Whereas early publications on the RBV (Barney, 1991; Peteraf, 1993; Rumelt, 1991) focused on the relationship between resource possession, such as firm-specific HC, and firm performance, the later literature has addressed the importance of considering how resources are exploited (Barney, 1995, 1997). More specifically, the resource orchestration literature (Sirmon, Hitt, & Ireland, 2007; Sirmon, Hitt, Ireland, & Gilbert, 2011) has provided a structured framework for addressing this issue and resource orchestration has emerged to become a key construct for understanding resource exploitation (Barney, Ketchen, & Wright, 2011; Chadwick, Super, & Kwon, 2015). However, most studies on HC have concerned developing valuable HC or/and appropriating this value (Bowman & Swart, 2007; Chadwick, 2017; Molloy & Barney, 2015; Nyberg et al., 2014) and not its exploitation. Thus, how different resource exploitation practices affect the relationship between firm-specific HC and firm performance remains an unexplored area.

According to the resource orchestration literature, a 'firm is unlikely to realize value creation unless it effectively leverages/uses those capabilities in the marketplace' (Sirmon et al., 2007, p. 283). Specifically, mobilisation, coordination, and deployment constitute the three processes of the leveraging dimension of resource orchestration (Chirico, Sirmon, Sciascia, & Mazzola, 2011; Sirmon et al., 2007) and, accordingly, they are a prerequisite for full realisation of firm-specific HC. Concerning *mobilisation*, the resource orchestration literature clearly stipulates that firms have to have an entrepreneurial vision of how to mobilise their resources (Sirmon et al., 2007, 2011). Moreover, an entrepreneurial strategy is a key *deployment* strategy (Sirmon et al., 2007), so being entrepreneurial encompasses both the mobilisation and the deployment dimension of resource orchestration. Entrepreneurial orientation (EO) is a strategic

posture characterised by being proactive, innovative and risk-taking which is used to identify (the mobilisation dimension) and act (the deployment dimension) upon market opportunities (Covin & Slevin, 1989; Miller, 1983; Richard, Wu, & Chadwick, 2009). In addition, Chirico, Ireland, and Sirmon (2011, p. 308) specifically state that EO 'provides the mobilising vision to use the unique knowledge resources' and employ it to consider the mobilisation dimension of resource orchestration. Further, firms with idiosyncratic HC are often pioneers in the product market, and this accentuates the importance of having an entrepreneurial strategy and vision of how to identify and explore new markets (Alvarez & Barney, 2002). Thus, EO should constitute a suitable proxy for mobilisation and deployment of firm-specific HC. Concerning the *coordinating* dimension of resource orchestration, the 'intent of coordinating is to integrate mobilised capabilities in an effective yet efficient manner' (Sirmon et al., 2007, p. 285). Thus, possessing potentially valuable resources and having an entrepreneurial vision of how to exploit them is not enough because firms have to coordinate their resources in order to fully exploit them (Barney, 1995, 1997). According to the resource orchestration literature, in order to exploit firm-specific HC, firms have to adapt human resource management (HRM) practices focusing on coordination and integration. Lepak and Snell (1999; Lepak & Snell, 2002) identified four different HR-configurations (commitment-based, productivity-based, compliance-based, and collaborative). Of these, collaborative HRM (CHRM) specifically 'encourage and reward cooperation, collaboration, and information sharing' (Lepak & Snell, 1999, p. 1999). Several key characteristics of CHRM, for example the use of cross-functional teams and the importance of joint involvement (Lepak & Snell, 2002), are specifically used as examples of coordination by Sirmon et al. (2007). Thus, from a resource orchestration standpoint, CHRM should be vital for coordinating the firm-specific HC of firms.

Although each resource orchestration process is important, the key challenge in resource orchestration is to synchronise the processes (Helfat et al., 2007; Sirmon et al., 2011). Thus, 'the integration and balancing of components to ensure harmony in the process is necessary to create value for customers' (Sirmon et al., 2007, p. 287). The importance of synchronising orchestration processes and the complexity of balancing several processes have also been confirmed in some empirical studies (Chirico et al., 2011; Huesch, 2013; Symeonidou & Nicolaou, 2018). Thus, although the resource orchestration literature indicate that excelling in all factors (i.e. firm-specific HC, EO, and CHRM) could be expected to lead to good performance, it is also plausible that being superior in one factor would compensate for being average in the others. This makes it relevant to examine

the possible three-way interaction effects of firm-specific HC, EO, and CHRM, and thereby to examine the synchronisation of resource orchestration processes. The aim of the present study is therefore to examine how EO and CHRM, individually and combined, can moderate the relationship between firm-specific HC and firm performance. This objective is achieved by examining the independent, two-way interactions and three-way interaction effects of these variables on firm performance in a sample of 151 Swedish manufacturing firms.

This article makes important contributions to HC theory and the RBV. Previous studies on HC or human resources have examined the effect human resources/HC and strategy have on performance (Hitt et al., 2001; Skaggs & Youndt, 2004; Wright, Smart, & McMahan, 1995), as well as how HRM and EO combined influence performance (Messersmith & Wales, 2011) and how commitment-based HR systems and HRM-orientations affect performance (Chadwick et al., 2015). Also, several studies on HC have examined the relationship between HC and performance. Most of these have used the RBV as the overall theoretical framework by arguing that HC is a valuable resource or that firm-specific HC is a valuable, rare and inimitable resource (Crook et al., 2011). In contrast to these earlier studies, the present study sets out to examine the extension of the RBV that is referred to as resource orchestration, to firm-specific HC. According to the RBV, in order for a resource to generate superior performance, it has to fulfil the VRIO-criteria by being valuable, rare, inimitable and 'organized to exploit the full competitive advantage of its resources' (Barney, 1995, p. 56). As in many previous studies, by examining the level of HC, this study considers the value criterion of VRIO, and by focusing on firm-specific HC, it addresses the rare and inimitability criteria. However, by testing the core tenets of resource orchestration in order to consider the organisation criterion (as suggested by Barney et al., 2011), it sets out to test basic assumptions regarding resource orchestration and its applicability to HC. That is, whether or not performance differences can be explained by the mobilisation, deployment, and coordination of firm-specific HC. Further, instead of assuming that the maximisation of coordination, mobilisation and deployment of firm-specific HC is always beneficial for firm performance, the three-way interaction analysis examines the nature of these relationships.

Theory and hypotheses development

Firm-specific HC and the RBV

Although HC can be regarded as both an individual-level and organisational-level construct, HC is defined in the present study as an

organisational resource that concerns the overall nature of an organisation's HC, what Ployhart et al. (2014) refer to as HC resources. The HC of an organisation refers to the knowledge, skills and abilities (henceforth referred to as 'skills') embodied within the organisation's people (Coff, 2002; Crook et al., 2011) that are useful in the production process (Becker, 1962). HC has two different dimensions which can be described by using the elements of the RBV VRIO-framework (Barney, 1991, 1995, 1997). The first dimension concerns the value of HC as firms can range from having extremely skilled employees to those with inferior skills (Bowman & Swart, 2007; Hatch & Dyer, 2004). The other dimension concerns the level of HC idiosyncrasy which can fluctuate from entirely firm-specific to entirely generic; the former having no applicability to other firms and the latter meaning that other organisations can deploy HC without any value loss (Campbell, Coff, & Kryscynski, 2012; Williamson, 1981). Specificity makes HC difficult or meaningless for competitors to imitate and without imitation, firm-specific HC will be rarer than general HC. The present study is concerned with firm-specific HC and, in accordance with Lepak and Snell (2002), the term 'firm-specific HC' is used to address superiority concerning both dimensions, that is highly valuable and highly firm-specific HC.

Resource orchestration through EO and CHRM

According to the RBV, firm-specific HC is a valuable, rare and inimitable (or to put correctly, not perfectly imitable) resource which also has to fulfil the O-criterion of the VRIO-framework to generate superior performance. Early RBV-literature on how to organise a firm in order to exploit its resources highlighted the importance of resource coordination (Barney, 1995, 1997) and entrepreneurship (Barney & Arikan, 2001). For example, Barney and Arikan (2001, p. 174) explicitly state that 'developing strategic alternatives that a firm can use to exploit the resources it controls is a creative and entrepreneurial process'. The question of resource exploitation has, however, mostly been elaborated and refined in the resource orchestration literature. Resource orchestration encompasses all aspects of resource management (Sirmon et al., 2007) and asset orchestration (Helfat et al., 2007), from the acquisition and accumulation of resources to bundling and leveraging the resources in the marketplace (Sirmon et al., 2011). The present study concerns how firms orchestrate existing firm-specific HC and not, for example, the trade-off between the exploration of existing knowledge and exploitation of new knowledge (Lin, McDonough, Lin, & Lin, 2013; March, 1991). How existing resources should be exploited is the area addressed in the

leveraging dimension of resource orchestration which has three key dimensions. Firstly, a firm has to have a vision of how to mobilise its firm-specific HC and be able to identify and act upon new market opportunities. Secondly, a firm has to adapt a leverage strategy and for firms with highly firm-specific resources, this usually requires an entrepreneurial leveraging strategy (Sirmon et al., 2007; Sirmon & Hitt, 2009). The EO of a firm encompasses both of these aspects of resource mobilisation and resource leveraging. Thirdly, a firm has to coordinate its resources effectively and efficiently (Sirmon et al., 2011). Thus, for firm-specific HC, firms have to apply HRM practices that focus on coordination and integration. With CHRM, the overall purpose is to promote coordination by, for example, collaboration, information sharing, and open communication (Lepak & Snell, 2002), making it a suitable indicator of resource coordination of HC. In the present study, based on the RBV and resource orchestration, EO and CHRM are used as proxies for resource exploitation.

EO concerns a firm's propensity to be innovative, risk-taking and proactive (Covin & Slevin, 1989, Covin & Slevin, 1991; Miller, 1983). These dimensions of EO are highly interrelated (Covin & Wales, 2012) and reflect a firm's orientation to favour new ideas and experimentation (innovation), to implement the outcome of such practices ahead of competitors (proactivity), and to commit resources to act upon the opportunities identified (risk-taking) (Covin & Slevin, 1989; Miller, 1983). EO is generally regarded as a strategic posture of a firm (Covin & Slevin, 1989; Pérez-Luño, Wiklund, & Cabrera, 2011) and consequently reflects 'many aspects of an organization's culture, value system, and mission' (Rauch, Wiklund, Lumpkin, & Frese, 2009, p. 763). EO has often been used to address how resources are exploited (e.g. Bouncken, Plüschke, Pesch, & Kraus, 2016; Jantunen, Puumalainen, Saarenketo, & Kyläheiko, 2005; Jiang, Yang, Pei, & Wang, 2016). Wiklund and Shepherd (2003, p. 1310) use EO in order to measure the "O" of the VRIO framework by arguing that 'EO captures a firm's organization toward entrepreneurship and can enhance other firm resources'. Further, Chirico, Sirmon, et al. (2011) specifically use EO to consider the mobilisation dimension of resource leveraging in their study on resource orchestration.

CHRM can be defined as HRM practices (i.e. job design, recruitment, training, performance appraisal and reward) (Lepak & Snell, 2002) 'that facilitate information exchange, trust, and collaboration' (Lepak & Snell, 1999, p. 42) among employees. More specifically, job design in CHRM focuses on the development of cross-functional teams and the close coordination between different organisational units (Lepak & Snell, 2002). Recruitment practices consider the candidate's ability to

collaborate with others, and 'skills for teamwork are necessary to pass any selection procedure' (Lopez-Cabrales, Pérez-Luño, & Cabrera, 2009, p. 489). Further, collaboration skills are emphasised in training initiatives, and reward and appraisal systems are designed to promote teamwork and collective efforts (Lepak & Snell, 2002). CHRM is especially important for firms with unique competences because teamwork is often crucial for integrating and leveraging idiosyncratic skills (Lopez-Cabrales et al., 2009; Nonaka & Takeuchi, 1995).

Firm-specific HC and firm performance

As argued for in the previous section, firm-specific HC fulfils the VRI-criteria of the VRIO-framework and there are several arguments as to why possessing firm-specific HC could result in superior performance. Having employees with well-developed skills (i.e. superior HC) will, of course, be beneficial for most companies (Bornay-Barrachina, la Rosa-Navarro, López-Cabrales, & Valle-Cabrera, 2012). This notion is a cornerstone of the knowledge-based view of the firm (Grant, 1996). As argued by Peteraf and Barney (2003, p. 318), 'only if a firm has access to value-generating resources that are uncommonly employed can it expect to produce the kind of value differential upon which competitive advantage depends'. Thus, the RBV stipulates that firm-specificity is a prerequisite for the achievement of sustained superior performance.

In addition, for firm-specific HC to be rare (by definition), it 'is tied semi-permanently to the firm and is thus very difficult to trade or exchange without loss of value' (Crook et al., 2011, p. 445). Other than enabling a firm to maintain HC and thereby sustain superior performance, the inimitability and/or non-transferability characteristics of firm-specific HC provide some more arguments as to why firms with such resources are likely to outperform competitors (Cabello-Medina, López-Cabrales, & Valle-Cabrera, 2011). When employee skills are firm-specific, they are less attractive to competitors. Thus, employees with such skills have reduced bargaining power and companies with firm-specific HC are consequently able to appropriate more rent than those with less idiosyncratic resources due to reduced employee mobility (Bowman & Ambrosini, 2000; Bowman & Swart, 2007; Coff, 1999; Wright, Dunford, & Snell, 2001). Moreover, possessing firm-specific HC will enable firms to continuously develop and refine their HC. As argued by Lepak and Snell (2002, p. 519), 'firms are more likely to invest in education, training, and development of skills when they are not transferable', because otherwise competitors would be able to reap the benefits of such investments.

Several comprehensive reviews of empirical RBV studies on the relationship between resources and performance (Andersén, Jansson, & Ljungkvist, 2016; Barney & Arikan, 2001; Newbert, 2007) have shown strong empirical evidence to suggest that firms with valuable, rare and inimitable resources, i.e. resource characteristics of firm-specific HC, perform better. In their meta-analysis, Crook, Ketchen, Combs, and Todd (2008, p. 1151) conclude that 'resource measures that meet RBT's criteria are more strongly related to performance than measures that do not meet the criteria'. Moreover, in a meta-analysis on the specific relationship between HC and firm performance, Crook et al. (2011, p. 443) find that 'HC relates strongly to performance, especially when the HC in question is not readily tradable in labour markets'. For example, several studies have identified a positive relationship between the level of HC and the level of firm performance (e.g. Cooper, Gimeno-Gascon, & Woo, 1994; Hayton, 2003; Shrader & Siegel, 2007; Skaggs & Youndt, 2004). Concerning specificity per se, Wang, He, and Mahoney (2009) were able to identify a positive direct relationship between firm-specific knowledge and performance; and Dutta, Narasimhan, and Rajiv (2005) found that firm-specific capabilities were strongly related to firm performance. Thus, in addition to the conceptual arguments, there have been many empirical studies suggesting that firms with firm-specific HC increase their performance. Thus, the baseline hypothesis can be expressed as:

Hypothesis 1: Firm-specific HC is positively associated with firm performance.

Firm-specific HC, EO, and performance

Various literature on entrepreneurship (Hills, Hultman, & Miles, 2008; Wiklund & Shepherd, 2005) has suggested that EO might be used to compensate for a lack of valuable resources. According to this viewpoint, firms with inferior firm-specific HC benefit more from being entrepreneurial because it becomes more important to make the best of what they have. However, the RBV (Alvarez & Barney, 2002) and the resource orchestration literature (Wales, Patel, Parida, & Kreiser, 2013) suggest that EO is more beneficial for firms with firm-specific HC. A key challenge for firms with firm-specific HC is to develop a creative vision regarding how to mobilise resources and EO provides this vision (Chirico et al., 2011). Thus, these firms have to rely on entrepreneurial strategy in order to fully deploy their HC (Sirmon et al., 2007) and an entrepreneurial posture is a key element for mobilisation and deployment of firm-specific resources (Helfat et al., 2007; Miao, Coombs, Qian, & Sirmon, 2017). That is, companies with firm-specific HC have to

implement new strategies and identify new opportunities to a greater extent (Andersén, 2007; Costa, Cool, & Dierickx, 2013; Dibrell, Craig, & Neubaum, 2014; Kor, Mahoney, & Michael, 2007). Thus, in contrast to strategies based on less firm-specific HC, those based on highly firm-specific HC are unique in that there is no-one to follow. Therefore, firms in this position must be marketplace pioneers when exploiting resources: 'Opportunity recognition is at the heart of entrepreneurship' (Ireland, Hitt, & Sirmon, 2003, p. 965) and the entrepreneurial ability to identify and exploit new opportunities is therefore very important for firms with highly firm-specific HC (Alvarez & Barney, 2002; Alvarez & Busenitz, 2001; Barney et al., 2011; Kor et al., 2007). More specifically, the innovation dimension of EO 'reflects a firm's tendency to engage in and support new ideas, novelty, experimentation, and creative processes' (Lumpkin & Dess, 1996, p. 142). Therefore, firms with highly firm-specific HC are likely to greatly benefit from adopting such practices because the exploitation of resources not already utilised in the product market requires elements of creativity and experimentation. Without an entrepreneurially orientated organisation, companies with firm-specific HC are therefore expected to have difficulties being innovative in the identification of opportunities for their (potentially) valuable and-by definition-rare resources (Ireland et al., 2003; Sirmon et al., 2011). Innovation, however, is not enough, and the firm has to act upon the opportunities identified by committing resources (i.e. taking risks) and being willing to act before competitors (proactiveness) (Miller, 1983). Consequently, without EO, companies could be expected to have difficulties in orchestrating firm-specific HC due to an inferior ability to mobilise and deploy their resources.

Based on this discussion according to resource orchestration and the RBV, firm-specific HC requires a firm to have a mobilisation vision and an entrepreneurial strategy in order to discover and act upon opportunities that have not been exploited previously. This makes EO more important for firms with firm-specific HC. Hence, the second hypothesis can be expressed:

> **Hypothesis 2:** EO moderates the positive relationship between firm-specific HC and firm performance, such that the positive relationship is strengthened under conditions of high EO.

Firm-specific HC, CHRM, and performance

According to the resource-based explanation of sustained performance differences (Barney, 1997; Barney & Arikan, 2001), especially when considering the RBV literature on resource orchestration (Sirmon et al.,

2011; Sirmon & Hitt, 2003), there are two main reasons as to why CHRM will positively moderate the relationship between the level of firm-specific HC and performance. Firstly, firm-specific HC is often developed over a long period of time (Crook et al., 2011) through internal accumulation (Maritan & Peteraf, 2011), therefore it cannot 'be separated easily from the context from which … [it] emanate[s]' (Gibbert, 2006, p. 129). The processes of accumulating firm-specific HC make these resources socially complex and thus dependent on several individuals in order to properly function (Dierickx & Cool, 1989; Grant, 1996; Lepak & Snell, 1999). Secondly, the skills among employees in firms with firm-specific HC are generally highly tacit (Lepak & Snell, 1999; Mahoney & Pandian, 1992); i.e. 'intuitive, non-verbalized, and difficult to articulate' (Andersén et al., 2016, p. 5). Tacit 'skills are deeply ingrained in people or organizations' and 'depend upon specific relationships (between colleagues, customers, etc.)' (Ambrosini & Bowman, 2001, p. 813).

The social complexity as well as the tacit characteristic of firm-specific HC accentuates the importance of CHRM for the effective and efficient exploitation of firm-specific HC. The overall purpose of CHRM is to promote collaboration within firms, and by adopting HRM-practices focusing on the ability to work in teams and integration between organisational units (Lopez-Cabrales et al., 2009), firms with firm-specific HC are expected to benefit more from 'organizing principles by which individual and functional expertise are structured, coordinated, and communicated, and through which individuals cooperate' (Nahapiet & Ghoshal, 1998, p. 242). As previously discussed, according to the resource orchestration literature, firms with highly firm-specific HC are more likely to be pioneers in the marketplace. This accentuates the importance of 'cross-functional teams and developing routines for rewarding creative ideas and projects that require the joint involvement' that can result in more integrated capabilities (Sirmon et al., 2007, p. 285). Furthermore, cooperation and coordination between employees and groups of employees are essential for leveraging of tacit skills (Grant, 1991, 1996). Sirmon et al. (2007, p. 285) specifically state that 'coordination of capabilities results in the sharing of explicit and tacit knowledge to integrate the capabilities into effective configurations'. Thus, recruiting team- and collaboration-orientated individuals, as well as implementing training activities to promote skills for teamwork and having job designs and reward systems that focus on collaboration are expected to be beneficial for firms with highly firm-specific HC. As argued by Lopez-Cabrales et al. (2009, p. 489), 'a teamwork design is critical for disseminating specialized knowledge throughout the organization'. Firms with inferior firm-specific

HC, and consequently employees with more explicit skills, will therefore find it easier to exploit resources and not be dependent on CHRM to the same extent. To summarise, the nature of firm-specific HC accentuates the importance of coordination and collaboration, and the following hypothesis can be expressed:

Hypothesis 3: CHRM moderates the positive relationship between firm-specific HC and firm performance, such that the positive relationship is strengthened under conditions of high CHRM.

Configurations of firm-specific HC, CHRM, and EO and performance

In line with the arguments presented for Hypotheses 2 and 3, the relationship between firm-specific HC and firm performance is expected to be strengthened by high levels of EO and CHRM. The resource orchestration literature does, however, suggest that the relationship is expected to be strengthened even more by the combination of high EO and high CHRM. A firm can be entrepreneurial, thus enabling it to have a vision and a strategy of how to leverage its firm-specific HC by identifying market opportunities. However, in order to fully exploit its firm-specific HC, it also has to rely on CHRM-practices to coordinate its resources because 'creating value and developing competitive advantages requires synchronization of the processes' (Sirmon et al., 2011, p. 1392). Thus, being the first to deploy firm-specific HC increases the importance of effective resource coordination (Ireland et al., 2003; Sirmon et al., 2011). Such firms are faced with uncertainty concerning their product market endeavours (through EO) and firm-specific HC (due to the social complexity and tacitness associated with such resources), and this combination accentuates the need for further coordination and collaboration. Thus, according to the resource orchestration framework, firms that excel in levels of firm-specific HC, CHRM and EO are expected outperform other configurations.

As a consequence of this discussion, firms with low EO and less developed CHRM would be expected to have difficulties in exploiting firm-specific HC. Thus, the combination of low EO and less developed CHRM can be expected to be worse for firms with firm-specific HC than for those with a combination of high EO and high CHRM.

Concerning the worst combination of EO and CHRM for firms with firm-specific HC, there is evidence and there are arguments to suggest that low EO and low CHRM is not the least beneficial combination. Instead, for firms with firm-specific HC, the combination of high EO and low CHRM can be expected to be outperformed by other configurations for two main reasons. Firstly, firm-specific HC is often accumulated over a long period of time and 'under certain conditions … resource accumulation has negative

effects on a firm's ability to achieve or sustain a competitive advantage (e.g. existence of inertia)' (Sirmon & Hitt, 2003, p. 347). Thus, because firm-specific HC takes time to develop, firms with highly specific HC may be associated with what Leonard-Barton (1992) refers to as core rigidities. Attempting to implement an entrepreneurial strategy, i.e. a strategy characterized by being highly innovative and renewal-oriented, when deploying firm-specific HC can therefore be problematic because some individuals or departments might be reluctant to change, preferring the status quo. However, firms adopting CHRM should be able to compensate for this, and Leonard-Barton (1992, p. 120) specifically uses 'cross-functional coordination by fostering more effective personal relationships' as an example of how to manage core rigidities. Thus, individuals in firms with a more collaborative culture would be more likely to embrace change and to comply with more altruistic actions. On the other hand, firms with firm-specific HC, high EO, and low CHRM could be expected to perform poorly. Secondly, as argued for in the discussion about Hypothesis 2, several studies have shown that EO is an efficient strategy for fully realising the potential of firm resources (Chirico et al., 2011; Wiklund & Shepherd, 2003), such as firm-specific HC. However, EO has been found to be most efficient in organisations characterized by 'procedural justice, trust, and organizational commitment' (De Clercq, Dimov, & Thongpapanl, 2010, p. 87) and in organisations with high levels of social capital (Stam & Elfring, 2008; Wu, Chang, & Chen, 2008). Because CHRM is focused on developing and strengthening trust, commitment, and social capital, entrepreneurial firms with inferior CHRM might be expected to encounter problems when realising their firm-specific HC.

To summarise, a three-way interaction effect of firm-specific HC, EO and CHRM on firm performance is expected. As such, the final hypothesis is expressed:

Hypothesis 4: There is a three-way interaction effect of firm-specific HC, EO and CHRM on firm performance. The nature of this effect is that:

(4a) EO combined with CHRM moderates the positive relationship between firm-specific HC and firm performance, such that the positive relationship is the strongest under conditions of high EO combined with high CHRM.

(4b) High levels of EO combined with low levels of CHRM moderates the relationship between firm-specific HC and firm performance to a weaker extent than other configurations, such that the positive relationship is the weakest or non-existent under conditions of high EO combined with low CHRM.

(4c) Low levels of EO combined with low levels of CHRM moderates the relationship between firm-specific HC and firm performance to a weaker extent than high EO/high CHRM but to a higher extent than high EO/low CHRM.

Method

Sample

The population in question involves Swedish manufacturing firms with 20–250 employees. Very small firms seldom have any formal HRM practices (Mayson & Barrett, 2006), making these less relevant to examine. Meanwhile, larger firms can have several different HRM practices (Kesler, 1995) and various levels of EO (Birkinshaw, 1997) for different business units, making the results of such surveys difficult to interpret. Using the database 'Infotorg Företag', which covers all Swedish firms, 450 manufacturing firms with 20–250 employees were randomly selected by using the random function in excel. The database contains annual reports and other information on all Swedish companies and was used to collect contact information as well as the objective measures used in the study.

Each company was initially contacted by e-mail with a link to an online survey. The e-mail was sent directly to the firms' chief executive officer (CEO), or when this information was not available, to the firm's generic e-mail address asking them to forward it to the CEO. Firms that did not respond were contacted by e-mail with two reminders or, whenever possible, by telephone. In total, 151 usable responses were received, giving a response rate of 33.5%. As recommended by Armstrong and Overton (1977), the respondents were split into two groups according to whether they had been early or late repliers. The respondents did not show any significant differences in any of the subjective variables examined; nor did the surveys that were sent directly to the CEOs (74% of the surveys) and those sent with requests to be forwarded to the CEO show any significant differences in their replies. In addition, objective data in terms of return of assets (ROA) were used for measurement of performance. This is described in more detail in the next section. In order to consider industry differences, the industry average for a particular firm was subtracted from its ROA. After this transformation, the median ROA for the firms in the sample was 0.09%. The closeness to '0' indicates that the firms constituted a representative sample of the population.

Dependent variable

Performance is the dependent variable and was measured using the objective average ROA for the year in which the survey was conducted, as well as the previous 2 years. ROA is a widely used measure in resource-based studies (Amit & Schoemaker, 1993; Andersén et al., 2016;

Chatterjee & Wernerfelt, 1991; Mauri & Michaels, 1998; Newbert, 2007; Rumelt, 1991), and choosing such an established measurement of firm performance makes it possible to relate the results to other studies. The 151 firms belonged to 20 different industries in the manufacturing sector, based on the two-digit SNI classification (the Swedish equivalent of the US Standard Industrial Classification). As suggested by Armstrong and Shimizu (2007), ROA for each firm was adjusted by subtracting the industry average for each year. After this adjustment, the 3-year average ROA for each firm was calculated.

Independent variables

The three independent variables are the level of firm-specific HC, CHRM, and EO. All were measured using established subjective scales with the questions translated into Swedish and seven-point Likert scales used for the items. Average scores were used for each variable and these were standardised in the regression analysis.

Firm-specific HC

Firm-specific HC was measured using the 10-item scale developed by Lepak and Snell (2002) for measuring HC uniqueness. The respondents were asked to assess the accuracy of the following sentence: 'The employees in our organization have skills that…', followed by the statements used by Lepak and Snell (2002, p. 540).

Entrepreneurial orientation

EO was measured using the scale developed by Miller (1983) and Covin and Slevin (1989). The scale consists of nine items capturing innovativeness, proactiveness and risk-taking propensity, and is the most established measurement scale for EO (Rauch et al., 2009; Saeed, Yousafzai, & Engelen, 2014). Although, some studies have used less aggregated measures (by measuring each dimension separately). In the present study, the overall orientation to identify and act upon opportunities is of interest and EO is therefore regarded as a unidimensional construct (Miller, 1983). Thus, EO is used to measure whether or not resource orchestration is entrepreneurial, making it more relevant to consider EO as a unidimensional construct. Furthermore, because the present study seeks to examine three-way interaction effects, using a deconstructed operationalisation of EO would make the analysis highly complex.

Collaborative human resource management

A modified version of the collaboration-based HR configuration developed by Lepak and Snell (2002) was used for *CHRM*. In their original model, some questions concerning individual skills and industry expertise were included. These items, however, are not directly related to collaboration and, as expected, did not generate an acceptable model fit in the confirmatory factor analysis (CFA) described below. Using the six items which specifically concern collaboration yielded satisfactory convergent validity and discriminant validity. Therefore, those items were used in the analysis. Thus, the following six items—from Lepak and Snell (2002, pp. 527–528)—were used: 'employees perform jobs that require them to participate in cross-functional teams and networks'; 'recruitment processes emphasize their ability to collaborate and work in teams'; 'our training activities focus on team building and interpersonal relations'; 'performance appraisals are based on team performance'; 'performance appraisals focus on their ability to work with others'; and 'compensation/rewards have a group-based incentive'.

Scale validation of independent variables

CFA was used to examine the convergent and discriminant validity of the three constructs and the results are summarised in Table 1.

The model fit values showed acceptable levels concerning incremental fit (CFI = 0.91, TLI = 0.90), parsimonious fit (χ^2/df ratio = 1.69), and absolute fit (RMSEA = 0.07, SRMR = 0.06) (Hair, Black, Babin, & Anderson, 2010). The Chi-square value was significant ($P = 0.00$) but, as argued by, for example, Hair et al. (2010) and Hu and Bentler (1999), insignificant *P*-values are difficult to achieve with many items and small sample sizes, and model fit should be based on several criteria, especially with smaller sample sizes. Discriminant validity for all measures was satisfactory; the lowest square root value of the average variance extracted (AVE) was higher than the highest inter-construct correlation (Fornell & Larcker, 1981), and the maximum shared variance (MSV) lower than AVE (Hair et al., 2010). Convergent validity was assessed by examining AVE and composite reliability (CR). As evident from Table 1, AVE for EO was below 0.50. However, CR was high for all three variables and, as stated by Malhotra and Dash (2011, p. 702) based on Fornell and Larcker (1981), 'AVE is a more conservative measure than CR. On the basis of CR alone, the researcher may conclude that the convergent validity of the construct is adequate'. Thus, based on the high level of CR, and the fact that AVE for EO was close to the 0.50 threshold, the convergent validity was judged acceptable.

Table 1. Confirmatory factor analysis results.

Item/factor	Factor loading	Cronbach alpha	CR	AVE	MSV
Firm-specific HC (Lepak & Snell,2002)		0.920	0.921	0.542	0.196
The employees in our organization have skills that …					
… are not widely available in the labor market	0.66				
… would be very difficult to replace	0.70				
… are not available to our competitors	0.74				
… are widely considered the best in our industry	0.75				
… are developed through on the job experiences	0.53				
… are difficult for our competitors to buy away from us	0.77				
… are unique to our organization	0.85				
… are difficult for our competitors to imitate or duplicate	0.77				
… are customized to our particular needs	0.72				
… distinguish us from our competition	0.83				
EO (Covin & Slevin,1989)		0.891	0.890	0.476	0.196
Innovation 1	0.73				
Innovation 2	0.75				
Innovation 3	0.76				
Proactiveness 1	0.70				
Proactiveness 2	0.74				
Proactiveness 3	0.69				
Risk-taking 1	0.54				
Risk-taking 2	0.61				
Risk-taking 3	0.67				
Collaborative HRM (Lepak & Snell,2002)		0.889	0.894	0.584	0.178
Employees perform jobs that require them to participate in cross-functional teams	0.65				
Recruitment processes emphasize their ability to collaborate and work in teams	0.73				
Our training activities focus on team building and interpersonal relations	0.82				
Performance appraisals are based on team performance	0.79				
Performance appraisals focus on their ability to work with others	0.81				
Compensation/rewards have a group-based incentive	0.77				

CR, Composite Reliability; AVE, Average Variance Extracted; MSV, Maximum Shared Variance.
All factor loadings, $p < 0.001$.

Two alternative models were tested: a single factor model and a two factor model with one factor representing firm-specific HC and the other factor measuring overall resource deployment (i.e. CHRM and EO combined). Both models had poor fit; CFI = 0.73, TLI = 0.71, χ^2/df ratio = 3.02, $P = 0.00$, RMSEA = 0.12, SRMR = 0.17 for the single factor model, and CFI = 0.53, TLI = 0.49, χ^2/df ratio = 4.52, $P = 0.00$, RMSEA = 0.15, SRMR = 0.11 for the aggregated resource deployment model. As could be expected, Chi-square difference tests showed that the alternative models had worse fit indices than the original model. Moreover, when conducting the exploratory factor analysis described below, the single-factor solution accounted for 35% of the variance, indicating that common method bias was not a major issue.

Control variables

Four variables were controlled for using objective data: firm size, firm age, industry and previous performance. These variables have been found

Table 2. Descriptive statistics and correlation matrix.

	Mean	SD	Min	Max	1	2	3	4	5	6	7
1. Performance	1.31	11.25	−35.41	30.59	1						
2. Past performance	1.12	12.65	−28.31	32.49	0.62	1					
3. Age	36.83	18.40	2.00	98.00	−0.10	−0.03	1				
4. Size (log)	1.79	0.28	1.24	2.43	0.05	0.00	0.10	1			
5. Firm-specific HC	4.15	1.18	1.00	7.00	0.25	0.05	−0.14	−0.06	1		
6. CHRM	4.55	1.07	2.00	7.00	0.28	0.15	−0.10	−0.03	0.38	1	
7. EO	4.24	1.03	1.44	6.22	0.26	0.09	−0.19	−0.04	0.41	0.35	1

$N = 151$.
All correlations above 0.25 are significant at the 0.01 level.

to affect firm performance and have been frequently used in studies examining how performance is influenced by HRM (Arthur, 1994; Guest, Michie, Conway, & Sheehan, 2003), resources (Sleptsov, Anand, & Vasudeva, 2013; Wiklund & Shepherd, 2003) and entrepreneurship (Murphy, Gregory, & Hill, 1996; Wiklund, 1999). *Size* was transformed by $\log_{10}$-transformation in order to achieve normality. *Age* was measured using the time point of registration of the firm. The firms examined were distributed over 20 different industries (based on two-digit SNI classification) and dummy variables were used in order to control for *industry*. In order to control for *previous performance*, ROA, adjusted by industry average the year before the examined period, was included in the regressions (Armstrong & Shimizu, 2007).

Results

The descriptive statistics and bivariate correlations are presented in Table 2. As illustrated in the correlation matrix, when the control and the independent variables are excluded, firm-specific HC, EO and CHRM all correlate to performance. The independent variables are also correlated, but multicollinearity analysis showed that this was not a major issue; the highest variance inflation factor (VIF) being 1.58 for the independent variables. Moreover, because previous performance is strongly correlated to performance, additional regressions without this control variable were conducted. The result of these regressions corresponded to the results described below; i.e. support for Model 4 and a three-way interaction effect ($P < 0.05$). All variables and residuals were normally distributed and had acceptable skewness and kurtosis values (all values < 0.45) (Mardia, 1970) and no significant non-linear relationships (using squared terms for all independent variables) could be identified.

The four regression models are presented in Table 3. As shown in Model 2, Hypothesis 1—i.e. that the possession of idiosyncratic resources will increase firm performance—is supported. The regression coefficient of firm-specific HC was significant ($P < 0.05$) and the adjusted R^2

Table 3. Independent, two-way interactions, and three way-interaction models for firm-specific HC, EO, CHRM, and performance

	Model 1 (Controls)	Model 2 (Independent)	Model 3 (Two-way interactions)	Model 4 (Three-way interaction)
Past performance	6.46***	6.22***	6.28***	6.33***
Age	−0.53	0.12	0.36	0.62
Size	0.48	0.67	0.55	0.69
Industry (SNI 10, $n = 5$)	−1.70	0.45	2.85	0.43
Industry (SNI 14, $n = 2$)	−5.02	−2.52	−3.01	−8.29
Industry (SNI 16, $n = 12$)	1.03	0.75	1.60	−0.56
Industry (SNI 17, $n = 2$)	−2.57	−1.54	−1.04	−3.82
Industry (SNI 18, $n = 4$)	−3.61	−3.48	−4.24	−4.26
Industry (SNI 20, $n = 5$)	−4.53	−3.65	−5.44	−4.75
Industry (SNI 21, $n = 1$)	2.33	3.77	5.55	3.19
Industry (SNI 22, $n = 12$)	−2.83	−2.75	−1.69	−3.76
Industry (SNI 23, $n = 4$)	4.57	4.59	4.50	2.71
Industry (SNI 24, $n = 6$)	−7.46	−6.43	−6.39	−9.96
Industry (SNI 25, $n = 34$)	−2.82	−2.46	−2.68	−5.23
Industry (SNI 26, $n = 7$)	1.29	−1.92	−1.70	−6.06
Industry (SNI 27, $n = 6$)	2.94	4.82	5.87	3.65
Industry (SNI 28, $n = 24$)	−2.52	−1.74	−0.81	−4.07
Industry (SNI 29, $n = 10$)	−0.74	0.323	0.68	−1.39
Industry (SNI 30, $n = 5$)	−0.41	−0.30	0.67	−0.52
Industry (SNI 31, $n = 6$)	−4.89	−4.17	−4.52	−7.27
Industry (SNI 32, $n = 3$)	−9.47	−10.85	−9.66	−11.78
Industry (SNI 41, $n = 2$)	−6.14	−3.41	−2.68	−0.22
Firm-specific HC		1.73*	1.89*	1.31
EO		1.33	1.36	0.87
CHRM		1.01	1.23	−0.18
Firm-specific HC × EO			−1.34	−0.42
Firm-specific HC × CHRM			1.56	1.67
EO x CHRM			0.45	1.16
Firm-specific HC × EO × CHRM				2.23**
F	4.71***	5.28***	4.98***	5.40***
R^2	0.45	0.51	0.53	0.56
Adjusted R^2	0.35	0.42	0.43	0.46
Δ Adjusted R^2	0.35***	0.07**	0.01	0.03**
AIC	686.38	673.20	672.94	664.56
AIC_C	694.30	683.60	686.25	678.94
Δ AIC_C	15.36	4.66	7.31	0
Akaike weights	0.000	0.086	0.023	0.890
Evidence ratio	–	10.35	38.70	1
Log_{10} Evidence ratio	–	1.01	1.59	0

Unstandardized coefficients are reported.
Industry (SNI = 43, $n = 1$) not included as a dummy.
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

increased by 0.07 ($P < 0.01$). However, it is possible that the increase in R^2 could be partly explained by the addition of the other independent variables (i.e. EO and CHRM) in Model 2. An additional regression was therefore performed by only adding firm-specific HC (not EO and CHRM), which resulted in a similar outcome. The result of this regression is presented in Model 5 in the Appendix. Moreover, comparisons of R^2 are not designed for model comparison, and model selection based on adjusted R^2 consistently favours more complex models than using, for example, the Akaike information criterion (AIC) (Akaike, 1974; Gayawan & Ipinyomi, 2009). Further, corrected AIC (AIC_C) takes the sample size

into account and penalises additional parameters more than AIC (Burnham & Anderson, 2002). Given that Model 2 (683.60) has a much lower AIC_C than Model 1 (694.30), the robustness of Model 2 is confirmed and Hypothesis 1 is supported.

Hypotheses 2 and 3 postulate that EO and CHRM, respectively, positively moderate the relationship between firm-specific HC and performance. Model 3 shows neither of these hypotheses to be confirmed. Adding the two-way interactions did not increase the model's fit (increasing adjusted R^2 by 0.01, $P > 0.1$) and the interaction effects for EO and CHRM are not significant. In order to check the robustness of the model, additional tests were conducted by adding one interaction effect at a time, giving similar non-significant results. These tests are presented in Model 6 and Model 7 in the Appendix.

Hypothesis 4 stipulates that there is a three-way interaction effect of firm-specific HC, EO and CHRM on firm performance. Regression Model 4 confirms that there is a significant three-way interaction effect ($P < 0.01$), and the three-way interaction model increases the adjusted R^2 by 0.03 ($P < 0.01$). Model section analysis using AIC (Akaike, 1974) and the various suggested threshold values confirms that Model 4 is the best of the four models. The AIC_C (Hurvich & Tsai, 1989) for Model 4 is 4.66 lower than for the second best-model (i.e. Model 2), indicating that the competing model has considerably less support. The Akaike weight measures show that Model 4 has an 89% chance of being the best of the four and, as illustrated by the evidence ratio, is 10.35 times more likely to be accurate in comparison to Model 2. As illustrated by the evidence ratios and using the thresholds value suggested by Kass and Raftery (1995), Model 4 has stronger support than both Models 2 and 3. Thus, using AIC_C concludes the inclusion of a three-way interaction effect provides the best model (i.e. Model 4). The nature of the interaction effect is shown in Figure 1.

Hypothesis 4a stipulates that the combination of EO and CHRM will have an additional effect on the positive relationship between firm-specific HC and performance and this hypothesis is confirmed. Also, according to Hypothesis 4b, the combination of high EO and low CHRM would be expected to weaken or eradicate the positive relationship between firm-specific HC and performance. As illustrated in Figure 1, this combination actually reverses the relationship, thus Hypothesis 4b is also supported. According to Hypothesis 4c, the combination of low EO and low CHRM would be expected to moderate the relationship between firm-specific HC and performance to a lesser extent than the combination of high EO and high CHRM, but to a greater extent than the combination of high EO and low CHRM. Only the latter proposition

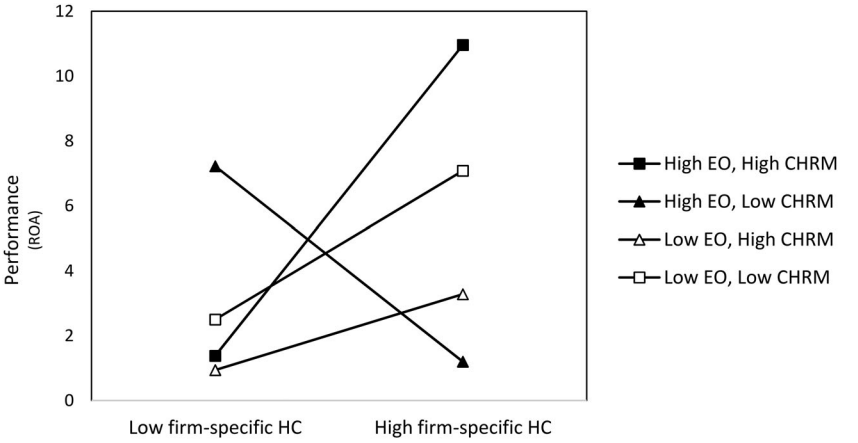

Figure 1. Three-way interaction effects.

is supported; thus, Hypothesis 4c is only partly supported. Slope difference tests showed that both the high EO/high CHRM configuration and the low EO/low CHRM configuration differed significantly from the high EO/low CHRM configuration ($P < 0.01$ for both comparisons). The difference between high EO/high CHRM and low EO/low CHRM was, however, not statistically significant.

Discussion

This study validates the established notion of a positive relationship between the level of firm-specific HC and firm performance found in many previous studies (Crook et al., 2011). However, contrary to Hypotheses 2 and 3, when examined separately neither EO nor CHRM have an effect on this relationship. Although this finding can seem to contradict a core assumption of the RBV, that is the importance of resource exploitation (Alvarez & Busenitz, 2001; Barney, 1995), it does, in fact, provide support for the relevance of the resource orchestration construct. Sirmon et al. (2007, p. 284) specifically state that different exploitation 'processes must work in a complementary manner for capabilities to be leveraged effectively'; a notion supported by some previous empirical studies on resource orchestration (Chadwick et al., 2015; Chirico et al., 2011) . Thus, the finding of a three-way interaction effect, that is simultaneously possessing a VRI-resource (i.e. firm-specific HC), coordinated exploitation practices (i.e. CHRM) and an entrepreneurial vision (i.e. EO), provides strong support for the core ideas of resource orchestration.

The finding that the combination of EO and CHRM strengthens the positive relationship between firm-specific HC and performance does not

only provide support for resource orchestration; it also validates previous research on resource-based theory (Costa et al., 2013), as well as EO and HRM research (Messersmith & Wales, 2011). Thus, as argued for in literature on resource exploitation (e.g. Alvarez & Barney, 2002; Sirmon et al., 2007), combining resource coordination and entrepreneurial strategy-making is a successful way to fully exploit firm-specific HC. However, the results also illustrate the complexity of HC exploitation and show the importance of adapting resource exploitation practices to the level of firm-specific HC.

The results concerning less successful exploitation practices of firm-specific HC, i.e. that entrepreneurial firms with firm-specific HC that does not rely on CHRM perform worst, support Hypothesis 4b. The reverse relationship provides strong support for the arguments provided for the hypothesis and CHRM is a crucial boundary condition for successfully combining firm-specific HC with EO. Although it is outside the scope of the present study (which focuses on firms *with* firm-specific HC), it is worth noting that the combination of high EO and low CHRM appears to be the most successful for firms with inferior firm-specific HC. As suggested by Wiklund and Shepherd (2005), an EO can enable firms with inferior resources to identify new markets and implement various differentiation strategies by identifying overlooked opportunities in the product market. Moreover, by being entrepreneurial, these firms can remain ahead of their competitors; that is, when competitors start seizing the same opportunities, highly entrepreneurial firms can identify new ones (Newey & Zahra, 2009; Zahra, Sapienza, & Davidsson, 2006). The results do, however, indicate that these firms should focus on other areas of HRM than CHRM; e.g. commitment-based or productivity-based HRM practices (Lepak & Snell, 1999, Lepak & Snell, 2002).

Interestingly, the combination of low EO and low CHRM also strengthens the positive relationship between firm-specific HC and performance. Although this finding contradicts many assumptions in the resource orchestration literature, these results are supported in another research stream originating from the RBV; the causal ambiguity literature (Ambrosini & Bowman, 2010; Reed & DeFillippi, 1990). Causal ambiguity is defined as an uncertainty 'of the relationship between a competency and its organizational outcomes' (King, 2007, p. 157). If firms with firm-specific HC are not entrepreneurial, continuously identifying and exploiting new opportunities, they become more dependent on preserving their existing resources. Inter-firm causal ambiguity and intra-firm causal ambiguity are strongly related and, according to Barney (1991, p. 109), 'both the firms that possess resources that generate a competitive advantage and the firms that do not possess these resources but seek to

imitate them must be faced with the same level of causal ambiguity'. The strong relationship between intra-firm causal ambiguity and inter-firm causal ambiguity is a core notion in the causal ambiguity literature, and is usually referred to as the causal ambiguity paradox (King, 2007; King & Zeithaml, 2001; McIver & Lengnick-Hall, 2017). Thus, if the relationship between HC and performance is known within a firm, it is much more likely that competitors will be able to acquire and/or develop similar resources (Barney, 1991; King & Zeithaml, 2001; Powell, Lovallo, & Caringal, 2006). CHRM is HRM practices that specifically concern the facilitation of 'information sharing and the transfer of knowledge necessary for joint decision making and productivity' (Lepak & Snell, 1999, p. 42). Such practices will reduce the level of intra-firm causal ambiguity. As stated by Andersén (2012, p. 446), 'Sharing and disseminating knowledge … within the organisation will (by definition) increase internal awareness regarding the knowledge of the firm, and the internal causal ambiguity is likely to be reduced …', and '… when the firm's awareness of its knowledge-based resources increases, other firms are more likely to learn about the knowledge' and this will increase leakage of knowledge from the firm. Thus, through the course of time, the rarity of the existing resources decreases and HC becomes less firm-specific. However, if non-entrepreneurial firms are able to safeguard their firm-specific HC by focusing on HRM practices other than collaboration—e.g. by increasing the productivity, commitment and learning of individuals (Lepak & Snell, 2002)—the findings suggest that they can perform well.

Although the findings of the present study can—in the main—be generalised to other manufacturing SMEs, they illustrate the complexity of exploiting firm-specific HC and accentuate the complex interaction between resources, EO and HRM on firm performance. Several previous studies on EO, HRM and HC have addressed two-way interactions on performance. For example, Wright et al. (1995) examined human resources and strategy, Messersmith and Wales (2011) examined HRM and EO, and Wiklund and Shepherd (2003) studied knowledge-based resource and EO. Examining the two-way interaction generally concerns an analysis of whether or not a single additional variable will strengthen a given relationship (as illustrated by Hypotheses 2 and 3). In line with, for example, Chirico, Sirmon, et al. (2011) and Chadwick et al. (2015), the present study provides a more nuanced picture of resource exploitation than merely arguing that resource coordination and entrepreneurship are always beneficial for firm performance. Whereas conceptual papers on resource orchestration (Sirmon et al., 2007, 2011) have argued for the importance of high levels of various resource management practices, the results of the present and other empirical studies (Chadwick

et al., 2015; Chirico et al., 2011); illustrate the importance of also considering various configurations of exploitation practices. These are consistent with traditional strategy typology research; i.e. that several different strategies can generate superior performance (Conant, Mokwa, & Varadarajan, 1990; Miles & Snow, 1978).

Managerial implications

The results of this study have some straightforward implications for managers. Firstly, they highlight that possessing firm-specific HC has a universally positive effect on firm performance and that firms will benefit from developing skills that are firm-specific. Companies without firm-specific HC, or lacking the ability or time to develop such resources, can instead achieve above-average performance by being highly entrepreneurial, combined with the adoption of HRM practices encouraging individualism instead of CHRM. Other combinations of EO and CHRM will generally result in inferior performance for firms without firm-specific HC.

Secondly, firms with firm-specific HC would be well advised to choose one of two specific exploitation practices. Managers in such firms should concentrate on being entrepreneurial and using HRM practices that focus on collaboration and coordination. Or, they should be highly conservative and defensive in the product market, combining such an orientation with HRM practices that do not focus on collaboration and coordination. Thus, managers of firms with firm-specific HC are advised not to adopt 'middle-of-the-road' strategies when managing idiosyncratic resources and instead adapt CHRM to their level of EO, or vice versa, depending on which management practice is most easily changed.

Limitations and future research directions

Only two types of resource management variables have been examined in the present study, and other resource management practices also likely moderate the HC-performance relationship. Although these exploitation practices are highly established in the resource orchestration literature, it would be of interest to examine HRM orientations other than CHRM, and more specifically, HRM practices focusing on productivity, commitment and compliance (Lepak & Snell, 1999; Lepak & Snell, 2002), and how these moderate the relationship between HC, EO and performance. For example, a defender strategy is often associated with productivity-orientated management practices, and it is very likely that non-entrepreneurial firms with firm-specific HC could benefit from productivity-orientated HRM. Moreover, EO is sometimes measured as three separate

constructs (i.e. risk-taking, proactiveness, and innovation) (Anderson, Kreiser, Kuratko, Hornsby, & Eshima, 2015; Kreiser, Marino, Kuratko, & Weaver, 2013) and examination of the separate effect of each variable would provide a more detailed explanation of how EO affects the exploitation of firm-specific HC.

Another limitation of the study is that performance and the independent variables were examined partially retrospectively; performance measured as the average from the current year and previous 2 years, and the independent variables from the current year. Although HRM (Kotey & Slade, 2005; Schuler & MacMillan, 1984) and EO (Fayolle, Basso, & Bouchard, 2010; Madsen, 2007) have been found stable over the years, future studies could employ longitudinal research designs by measuring performance after the collection of the subjective variables in order to examine its short and long-term effects.

Another interesting avenue for future research would be to examine other kinds of HC. The present study has examined how to orchestrate firm-specific HC and illustrated the complexity of orchestrating this kind of HC. Moreover, the study has indicated that firms with less firm-specific HC are likely to benefit from high EO and low CHRM. However, the management of generic HC is also a highly relevant area to explore in future research. For example, EO can compensate for inferior resources (Wiklund & Shepherd, 2005) and is also likely to be important for firms with generic HC. Thus, future research is encouraged to explore the area of orchestration of generic HC.

Concluding remarks

The findings of this study provide new insights into how to adapt resource orchestration practices to the level of firm-specific HC by illustrating the complex interaction between firm-specific HC, EO and CHRM, and firm performance. Moreover, the study illustrates the usefulness of using resource orchestration models for examining the exploitation of firm-specific HC, providing strong support for an emerging resource orchestration theory. Nevertheless, this study has only addressed some dimensions of resource orchestration. More research is needed to understand, for example, how resource orchestration affects not only the leveraging of firm-specific HC, but also the accumulation and bundling of resources in order to develop firm-specific HC.

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Appendix: Firm-specific HC and two-way interaction tests (EO × CHRM excluded)

	Model 5 (firm-specific HC)	Model 6 (two-way interaction HCxEO)	Model 7 (two-way interaction HCxCHRM)
Past performance	6.38***	6.25***	6.22***
Age	−0.06	0.13	0.28
Size	0.66	0.71	0.49
Industry (SNI 10, $n = 5$)	0.83	0.63	1.53
Industry (SNI 14, $n = 2$)	−4.02	−2.53	−2.78
Industry (SNI 16, $n = 12$)	1.46	1.01	0.71
Industry (SNI 17, $n = 2$)	−1.58	−1.47	−1.15
Industry (SNI 18, $n = 4$)	−3.75	−3.54	−3.89
Industry (SNI 20, $n = 5$)	−4.52	−3.75	−4.26
Industry (SNI 21, $n = 1$)	2.25	3.77	4.92
Industry (SNI 22, $n = 12$)	−2.44	−2.64	−2.27
Industry (SNI 23, $n = 4$)	5.11	4.70	4.29
Industry (SNI 24, $n = 6$)	−6.40	−6.32	−6.57
Industry (SNI 25, $n = 34$)	−2.35	−2.37	−2.62
Industry (SNI 26, $n = 7$)	−1.18	−1.49	−2.65
Industry (SNI 27, $n = 6$)	5.02	4.99	5.15
Industry (SNI 28, $n = 24$)	−1.58	−1.59	−1.48
Industry (SNI 29, $n = 10$)	0.54	0.39	0.48
Industry (SNI 30, $n = 5$)	0.13	−0.24	0.11
Industry (SNI 31, $n = 6$)	−3.05	−4.08	−4.49
Industry (SNI 32, $n = 3$)	−9.73	−10.53	−10.80
Industry (SNI 41, $n = 2$)	−4.52	−2.40	−4.96
Firm-specific HC	2.21***	1.73*	1.89*
EO		1.32	1.38
CHRM		0.99	1.15
Firm-specific HC × EO		−0.38	
Firm-specific HC × CHRM			1.18
F	5.37***	5.05***	5.24***
R^2	0.49	0.51	0.52
Adjusted R^2	0.40	0.41	0.42
Δ Adjusted R^2	0.05***	−0.01	0.00

Unstandardized coefficients are reported.
Industry (SNI = 43, $n = 1$) not included as a dummy.
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.
Change statistics for Model 5 based on comparison between Model 1 (see Table 3) and Model 5.
Change statistics for Model 6 and 7 based on comparison between Model 2 (see Table 3) and Model 6/7.