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The complementarity of strategic orientations: A meta-analytic synthesis and theory extension

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Abstract

***Research Summary*:** A firm's strategic orientation has long been of interest in management and strategy research. In particular, entrepreneurial, market, and learning orientations have received thorough theoretical and empirical research attention. In this meta-analysis, we compare the direct and combined performance effects of these orientations, explore their interrelatedness, and provide a theoretical foundation for complementarity between the three. Building on prior empirical findings from 210 samples and using structural equation modeling and seemingly unrelated regression techniques, we extend the knowledge base on strategic orientations. Our results provide evidence for interrelatedness and complementarity among strategic orientations, indicating that superior firm performance emerges from its capability to align entrepreneurial, market, and learning orientations.

***Managerial Summary*:** Managers might be tempted to divide rather than combine their attention on various aspects of strategy, such as entrepreneurial, market, and learning orientations. Similarly, organizational culture might inhibit or promote collaboration between distinct organizational functions. We synthesize a vast body of research on firm-level strategy making and reveal that while each strategic orientation is beneficial on its own, together, the three strategic orientations create synergies that surpass the effects of individual strategic orientations. Therefore, to achieve superior performance, firms need to

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align their strategy making efforts to (a) monitoring changes in customer needs and competitor moves, (b) engaging in creative processes, and (c) assimilating the extensive knowledge gained from these activities.

KEYWORDS
complementarity, firm performance, meta-analytic structural equation modeling, seemingly unrelated regression, strategic orientations

1 | INTRODUCTION

Following the seminal study by Venkatraman (1989), researchers have undertaken immense efforts to elaborate conceptually on the elements of the strategy construct. Over the past four decades, several strategic orientations (SOs) have been suggested, yet entrepreneurial (EO), market (MO), and learning (LO) orientations still draw most theoretical and empirical attention (e.g., Hakala, 2011). While EO reflects the degree of a firm's entrepreneurial activity (Covin & Wales, 2012), MO refers to the orientation toward the expressed and latent needs of customers (Narver & Slater, 1990), and LO implies a firm's capability to create, acquire, and use knowledge (Calantone, Cavusgil, & Zhao, 2002).

The extant literature suggests that these strategic modes create a higher-order construct termed "strategic orientation" (e.g., Mu & Di Benedetto, 2011; Zhou, Yim, & Tse, 2005), "positional advantage" (Hult & Ketchen, 2001; Lonial & Carter, 2015), "culture of competitiveness" (Hult, Ketchen, & Nichols, 2002) or "proactive learning culture" (Gnizy, Baker, & Grinstein, 2014; Wales, Beliaeva, Shirokova, Stettler, & Gupta, 2018). Considering several strategic modes simultaneously has "the potential for fewer blind spots," whereas a single-mode orientation "may suffer from limitations and biases" (Hart, 1992, p. 345). Most studies on the combinations of SOs reveal that they are highly interrelated yet distinct, both conceptually and empirically (Baker & Sinkula, 2009). Acknowledging high levels of interrelatedness between them, researchers (e.g., Hakala, 2011) have characterized SOs as complementary, meaning that these strategic modes make each other *complete.*

We hold that EO, MO, and LO are complementary in the sense that their combination has a super-additive performance effect (Tanriverdi & Venkatraman, 2005). In line with this perspective, firms need to align their capabilities to (a) bring new products to the market, (b) actively monitor changes in consumer demand and competitor moves, and (c) engage in new practices and the discard old ways to achieve superior performance. While the resource-based view (RBV) (Barney, 1991) predicts the positive performance effects of market, entrepreneurial, or learning orientations, it does not explain why their combination should result in an even superior performance outcome. To address this limitation, we integrate the insights from the RBV extended with the resource orchestration framework (Barney, Ketchen, & Wright, 2011; Sirmon, Hitt, Ireland, & Gilbert, 2011). We test this view on complementarity in a meta-analytical setting. Prior meta-analyses focused on the separate effects of entrepreneurial (Rauch, Wiklund, Lumpkin, & Frese, 2009), market (Kirca, Jayachandran, & Bearden, 2005), and learning orientations (Keith & Stephen, 2006), or on the interrelationships between SOs (Grinstein, 2008), leaving performance effects of their combinations unsynthesized.

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Our study offers contributions to theory (a), method (b), and context (c) of the research on SO complementarity. First, we refine existing theoretical perspectives underlying SO complementarity. Specifically, we posit that SO complementarity emerges from the inherent interrelatedness between EO, MO, and LO and is deliberately orchestrated by managers. The view on SO complementarity as an *inherent property* is in line with the RBV and its focus on resource characteristics (Barney, 1991). Complementarity as a *managerial choice* is grounded in the extended RBV and resource orchestration perspective (Sirmon et al., 2011), which emphasize the role of managers in aligning firm resources toward synergy (Holcomb, Holmes, & Connelly, 2009). We contribute to the extensive literature on complementarity considering these two sources of SO (e.g., Milgrom & Roberts, 1990) and advance the organizational design literature that previously framed search and stabilization mechanisms as forces that create interdependencies (Rivkin & Siggelkow, 2003).

Second, we follow the suggestion of Ennen and Richter (2010) to explore the middle ground between various approaches when studying the complementarity of strategies, those considering interactions between individual factors in isolation and those focusing on the performance effects of entire systems containing multiple elements. By integrating meta-analysis, structural equation modeling (MASEM) (Bergh et al., 2016), and seemingly unrelated regression (SUR), we are able to both summarize and extend the existing knowledge base on SOs. In this process, we distinguish between interdependencies among pairs of orientations and assess their joint performance effects before establishing their super-additive effects. As noted above, most prior research defines complementarity broadly as a combination of activities that either (a) "make each other complete" or even (b) result in abnormal performance returns. In line with these conceptualizations, the correlational approach to testing for complementarity focuses on interrelatedness, whereas the performance approach focuses on super-additive effects (Aral, Brynjolfsson, & Wu, 2012; Brynjolfsson & Milgrom, 2012). However, in our study, we delineate between interrelatedness and complementarity and suggest that the former is necessary but insufficient for the latter. Thereby, we frame interrelatedness as a prerequisite for complementarity and test it accordingly.[1] Based on the information gathered from 210 independent samples reported in 202 studies (n = 48,593), our study adds to research streams such as strategic management, entrepreneurship, and marketing.

Our third contribution is contextual, as we perform sensitivity analyses, compare cross-study variance in the distribution of effect sizes, and establish factors that explain this variance. In doing so, we distinguish between contextual (e.g., industry, geographic location of firms) and measurement variables (e.g., type of performance measures and strategic orientation scales used in the analyses). Consequently, we are able to identify contexts and conditions that are more predictive of higher firm performance than are others.

2 | THEORETICAL BACKGROUND AND HYPOTHESES

A central premise of any business firm is creating and sustaining value (Conner, 1991). Consistent with the RBV, a firm's resources and capabilities underlie its value-creating potential and form the basis of its competitive advantage. A sustainable competitive advantage stems from resources and capabilities that are valuable, rare, and difficult to imitate or substitute (Barney, 1991). Indeed, findings from a meta-analysis by Crook, Ketchen, Combs, and Todd (2008) reveal that capabilities such

[1]We use the terms "interrelatedness" and "interdependence" interchangeably to refer to the correlational relationships between the strategic orientations, whereas we use "complementarity" or "synergy" interchangeably to describe how this interrelatedness feeds a common purpose (e.g., performance increase). We thank an anonymous reviewer for drawing our attention to this issue.

as human or intangible resources have superior performance effects than tangible resources (corrected mean effect sizes 0.30, 0.24, and 0.08, respectively). We view EO, MO, and LO as distinct, intangible capabilities, which are tied to organizational routines and practices, developed over long time periods, and therefore, cannot easily be imitated or duplicated (Barney, 1991; Makadok, 2001; Peteraf, 1993).

To conceptualize a firm's SO, we adopt a dimensional perspective and focus on seizing differences along a set of strategic characteristics that collectively describe the content of strategy (Venkatraman, 1989). In this conceptualization, the individual SOs are indicative of a firm's overall "strategic orientation" and reflect its orientation toward new markets or product entry, customer needs, and competitor moves, as well as assimilation of the extensive knowledge gained in this process.

2.1 | Direct effect of strategic orientations on firm performance

The impact of EO, MO, and LO on firm performance has been of central interest in a wide variety of empirical investigations. Most studies show that SO has a strong conceptual and empirical association with firm performance (cf. Keith & Stephen, 2006; Kirca et al., 2005; Rauch et al., 2009).

2.1.1 | Entrepreneurial orientation

EO is commonly defined as a firm's strategic posture toward entrepreneurship (Anderson, Kreiser, Kuratko, Hornsby, & Eshima, 2015); it is mainly captured along the dimensions of innovativeness, proactiveness, and risk taking (Covin & Slevin, 1989). Innovativeness refers to a "firm's tendency to engage in and support new ideas, novelty, experimentation, and creative processes that may result in new products, services, or technological processes" (Lumpkin & Dess, 1996, p. 142). A firm's proclivity toward taking risks can be viewed in terms of substantial resource commitments and uncertainty of returns (Baird & Thomas, 1985). Proactiveness relates to opportunity seeking (Venkatraman, 1989) and involves seizing initiative and shaping the environment (Lumpkin & Dess, 1996).

Overall, EO represents a valuable resource because it enables firms to grasp opportunities as they arise and develop new ideas ahead of competitors, which gives them first-mover advantages (Wiklund, 1999). It is difficult to transfer, replicate, or copy a capability that is rooted in specific organizational practices and processes (Zander & Kogut, 1995). Firms vary in their willingness to take risks and commit resources to projects with uncertain returns as well as in their capacity to innovate and act proactively in the pursuit of opportunities (Covin & Slevin, 1989; Miller & Friesen, 1982). For this reason, an EO can be viewed as the distinct capability of a firm and a source of competitive advantage. However, prior research on the performance effects of EO has yielded equivocal results: whereas most studies report positive effects, some have obtained negative or insignificant results (Rauch et al., 2009). Often, researchers explain this variation in the EO–performance relationship by the moderating role of environment (i.e., dynamism, hostility, and so on) (Moreno & Casillas, 2008; Wiklund & Shepherd, 2005) or by the need to align EO with other organizational capabilities, for example, MO (Atuahene-Gima & Ko, 2001) or LO (Krauss, Frese, Friedrich, & Unger, 2005). Therefore, we formulate:

Hypothesis 1 (H1): *Entrepreneurial orientation is positively related firm performance.*

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2.1.2 | Market orientation

MO captures "activities involved in acquiring information about the buyers and competitors in the target market and disseminating it throughout the business(es)" (Narver & Slater, 1990, p. 21). Firms incorporating this orientation are considered to create superior customer value with their products and services based on their market knowledge (Kohli & Jaworski, 1990). Moreover, MO implies responsiveness to this knowledge within a firm and across the various departments and functional areas (Narver & Slater, 1990). The literature contains two perspectives on the nature of MO: Narver and Slater (1990) define MO along the culturally related dimensions of customer orientation, competitive orientation, and inter-functional coordination, whereas Kohli and Jaworski (1990) propose the following alternative behavioral dimensions: generation of market intelligence, sharing of this intelligence throughout the firm, and responsiveness to intelligence. Cadogan and Diamantopoulos (1995) conducted a comparative analysis, which revealed both overlaps and distinctiveness of the two perspectives on MO. Therefore, in this study, we consider both conceptualizations of MO.

Overall, MO is a valuable capability, because firms incorporating this orientation possess superior knowledge about the external environment, and therefore, are capable of responding more quickly to market changes by adjusting their actions (Slater & Narver, 1995). However, the challenge is to balance customer-led and market-oriented propensity to act (Conner, 1991). The search for this balance is unique for every firm and is rooted in its specific organizational practices and processes (Day, 1994). An essential capability that enables firms to increase performance is accounting for customer needs and preferences while being aware of the actions of possible competitors (Kohli & Jaworski, 1990; Narver & Slater, 1990). Although most studies report a positive relationship between MO and firm performance, some studies have also found non-significant or negative relationships (Ellis, 2006). Thus, in specific contexts, it might be more or less beneficial for the firms to be market-oriented and invest their time and efforts in acquiring and distributing the relevant market information (Kirca et al., 2005). Therefore, we hypothesize:

Hypothesis 2 (H2): *Market orientation is positively related to firm performance.*

2.1.3 | Learning orientation

LO is a firm's tendency to question long-held organizational norms (Baker & Sinkula, 1999). Commitment to learning, open-mindedness, and shared vision are widely recognized dimensions of the construct, although additional dimensions such as intra-organizational knowledge sharing exist (Calantone et al., 2002). Commitment to learning manifests in the value that firms hold toward learning (Sinkula, Baker, & Noordewier, 1997). Open-mindedness relies on "the ability and willingness to learn from experience of others, including customers, competitors, and channel partners" (Day, 1994, p. 5). Shared vision refers to the extent to which the assumptions, values, and beliefs of the organizational members converge. Other LO conceptualizations consider learning effort (De Clercq, Sapienza, & Crijns, 2005) or learning intention (Hanvanich, Sivakumar, & Hult, 2006).

Overall, learning oriented firms "think outside the box," question the validity of existing knowledge, and adjust behavioral theories in use (Baker & Sinkula, 1999; Sitkin, 1992). Owing to rapid technology developments and challenging competitive landscapes, firms need to adjust their behavior as they learn from successes and failures (Slater & Narver, 1995). The ability to constantly reassess and critically evaluate existing knowledge is related to a better understanding of the marketplace. Learning oriented firms tend to have more sophisticated decision-making processes and outperform

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their rivals (Hult, Ketchen, & Arrfelt, 2007). Moreover, the anchoring of information and knowledge in organizational memory, in the form of shared beliefs and mental maps, provides such firms with competitive advantages (Sinkula et al., 1997). Schilling (2002) argues that learning generates capabilities, including the improved ability to choose among potential learning projects and meet customer expectations. In contrast, failure to learn may result in a competency trap due to path dependencies (Levinthal & March, 1993) and inertia (Lieberman & Montgomery, 1998). Hence, the impact of LO on firm performance has been found to be positive, and in most studies, highly significant (e.g., Yilmaz, Alpkan, & Ergun, 2005; Zhou et al., 2005). Therefore, we test the individual performance contribution of LO:

Hypothesis 3 (H3): *Learning orientation is positively related to firm performance.*

2.2 | Complementarity effect of the overall strategic orientation on firm performance

In explaining the sources of superior performance, the RBV evolved from "a rather static list of the ingredients for competitive advantage … into a dynamic recipe explaining the process by which these ingredients must be utilized to attain this end" (Newbert, 2007, p. 124). Besides the assumptions of resource heterogeneity and their imperfect mobility across firms within an industry (Barney, 1991), the RBV, in its original conceptualization, suggested that firms do not vary in their ability to create value from the resources they possess (Adegbesan, 2009). Indeed, the initial focus of the RBV was on individual resources and their distinct characteristics, as the basis of a sustained competitive advantage. However, from the resource management perspective, synchronizing or bundling resources is at least as critical to value creation as possessing and owning them (Hansen, Perry, & Reese, 2004; Holcomb et al., 2009; Kor & Mahoney, 2005; Sirmon, Hitt, & Ireland, 2007). Therefore, synergies arising from the interrelatedness of firm-specific resources and capabilities can be used to explain superior firm performance (e.g., Song, Droge, Hanvanich, & Calantone, 2005; Tanriverdi & Venkatraman, 2005).

Drawing on the theory of supermodularity (Milgrom & Roberts, 1990), complementarity can be described as a situation when "the whole is more than the sum of its parts" (Milgrom & Roberts, 1995, p. 184), specifically that the existence of one activity or resource increases the marginal benefit of the other. Consequently, a combination of activities or resources of firms might be more valuable[2] than in isolation (Song et al., 2005).

Researchers have previously argued that complementarity might be regarded as a synonym for (organizational) fit or congruence (Ennen & Richter, 2010; Krishnan, Miller, & Judge, 1997) and synergy (Tanriverdi & Venkatraman, 2005) in a firm's activity system (Porter & Siggelkow, 2008). There is a subtle difference between these two groups of terms. While synergy and complementarity focus on *superior returns* from these interrelationships (i.e., either from cost savings or from increased sales), fit and congruence draw research attention to the *interrelationships* between individual activities (e.g., how they fit together and the environment). Fit and congruence also resonate with Thompson's (1967) term *reciprocal interdependence*, with which they describe tasks or units that "feed their work back and forth among themselves [so that] each receives input from and provides output to others, often interactively" (Kumar & Van Dissel, 1996, p. 283). In the case of SO, this implies that entrepreneurial, market, and learning postures are interrelated and share an underlying

[2]Tanriverdi and Venkatraman (2005) use the term "super-additivity."

"common core." A firm's alertness toward change (e.g., in customer needs, competitor moves, technological shifts) and its readiness to alter the status quo (Baker & Sinkula, 1999; Sinkula et al., 1997), represents examples of such a common core. While reciprocal interdependence postulates that SOs are interrelated, the complementarity of activities implies that their joined adoption is associated with super-additive performance effects. As such, interrelatedness between SOs serves as a necessary but insufficient condition for their complementarity.

Based on the logic of Porter and Siggelkow (2008), we elaborate on the potential sources of SO interdependence and complementarity. Specifically, we argue that both emerge as an *inherent property* of the three orientations and as a function of *managerial choices.*

Consistent with the logic of *inherent property*, SO has been conceptualized as a culture of competitiveness (e.g., Hult et al., 2007) and described as an element of organizational culture (Noble, Sinha, & Kumar, 2002). In this sense, the three orientations are naturally interconnected when innovation and experimentation are geared toward superior customer value, and embedded in the continuous improvement of the firm's process and systems. In line with this view, Schindehutte, Morris, and Kocak (2008, p. 21) define EO and MO as "key SOs underlying market-driving behavior." Extensive knowledge about current and future customers, and preliminary testing of the market response to innovation, represent examples of a direct link between EO and MO. Nasution et al. (2011, p. 341) state that "in the hotel services, the more close interaction between the hotel staff and their customers, the greater the opportunity to enhance value to customers' experiences." In the absence of such a connection, strategic efforts are doomed for failure. Furthermore, Hult, Hurley, and Knight (2004) argue that MO becomes even more valuable in a rapidly changing environment because it allows firms to modify and adapt their products and services faster than in a stable environment. Similarly, Sheng, Zhou, and Lessassy (2013) argue that innovators acquire larger market shares and build more customer loyalty. They beat imitators by quickly updating their product offered, thus, motivating consumers to restrain from buying counterfeited or imitative brands. Indeed, firms taking a leadership or pioneer position in markets tend to combine strong marketing and innovation capabilities (Smith & Grimm, 1987), which implies that they capitalize on emerging market opportunities by focusing on manifested or latent customer needs. Additionally, Slater and Narver (2000) highlight the interdependence between the pairs of orientations and argue that MO is primarily concerned with learning from various forms of contact with customers and competitors, whereas EO implies learning from experimentation.

Valuable knowledge about the market is required not only for successful product development, but also for market segmenting and positioning decisions. In their empirical study, Rhee, Park, and Lee (2010, p.72) reveal, "technology-based small firms are more likely to become learning-oriented when making continuous efforts to observe their customers and competitors." Lack of alignment between MO and LO inhibits systematic collection and use of customer and competitor data in strategic decisions.

Finally, willingness to question and discard outdated practices characterizes firms with strongly connected EO and LO. Such firms are keen in capturing both internal and external signals, and therefore, can make timely adjustments based on the opportunities for change and transformation, which they have identified. Indeed, in a sample of women-owned businesses, Rodríguez-Gutiérrez, Fuentes-Fuentes, and Rodríguez-Ariza (2014), p. 552) argue that EO places the company ahead of its competitors because "the ability to acquire knowledge and the ability to ensure that this knowledge permeates all levels are powered by the generation of new ideas, openness to new ventures despite risk, and launching of these ideas at the right moment." Without interconnected EO and LO, firms lose effectiveness when environmental or organizational conditions change.

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On the other hand, managerial choices may underlie interdependencies and complementarity between the three SOs. Holcomb et al. (2009) emphasize the role of managerial ability in synchronizing resources to create performance advantages. For example, managerial failure to establish a coherent system of activities may inhibit coordination and hamper the benefits of automation in manufacturing (Stieglitz & Heine, 2007). To capture potential benefits, it is necessary to couple modern manufacturing technologies with changes in organizational structures, human resource policies, and market positioning. Additionally, a firm's activity system may be configured to allow adjustments in EO based on the information gathered using MO (see Porter & Siggelkow, 2008). In this case, R&D and marketing departments should not only exchange valuable information (e.g., market reports), but also adjust the frequency of this exchange. There will be little value in quarterly adjustments of the product offered if market information is collected only once a year. However, if product developers were to receive market reports quarterly, the benefit of increasing the frequency of product adjustments from once a year to once a quarter would be higher. Thus, the extent to which resources or capabilities complement each other can be evidenced by the degree of synchronization between their combinations. Synchronization is defined as an activity involving "the integration and balancing of interdependent bundles to ensure that activities reinforce and align with the firm's strategic and competitive context" (Holcomb et al., 2009, p. 464). According to this definition, a firm with many resource combinations that reinforce each other has a high degree of synchronization.[3] Thus, the managerial ability to transform and align resources becomes paramount for complementarity to emerge. Specifically, general management might tell lower-level managers the activities (not) to engage in and advise them to coordinate the appropriate changes across departments (Holcomb et al., 2009; Stieglitz & Heine, 2007).

The extended RBV (Barney et al., 2011) embraces the resource orchestration framework (Sirmon et al., 2011), and draws attention to the role of managers behind the processes of "structuring the firm's resource portfolio, bundling the resources to build capabilities, and leveraging those capabilities with the purpose of creating and maintaining value for customers and owners" (Sirmon et al., 2007, p. 273). Chirico et al. (2011, p. 311) focus on the leveraging element of resource orchestration and argue that EO "provides the mobilizing vision that guides the use firm resources." In turn, MO helps avoid technological myopia and streamlines a firm's efforts toward relevant consumer market needs (Bhuian, Menguc, & Bell, 2005; Wales, Patel, Parida, & Kreiser, 2013), creating a platform for pioneering. This bundling process relies on learning and involves the creation of new capabilities with which firms address their competitive context. Learning plays an important role in facilitating decisions about the necessity of internal adjustments, such as extending current skills, and integrating them with existing ones (Atuahene-Gima & Ko, 2001; Sirmon et al., 2007). In the example above, this can be attained through budgeting, long-term plans, and other managerial decisions pertaining to resource allocation and reallocation.

Stieglitz and Heine (2007) emphasize the role of general management in setting strategic direction, which is "necessary to induce and coordinate the appropriate changes across departments." Specifically, such central strategic direction means that "general management tells lower-level managers what activities (not) to engage in and advises them on the general level of each activity, while leaving the specifics to lower-level managers" (Stieglitz & Heine, 2007, p. 4). In turn, when managers fail to

[3]Sirmon et al. (2011) discuss the managerial aspects of creating bundles of activities, and thereby, combine the notions of synchronization and orchestration. They state, "top-level managers direct the synchronization of the firm's resource orchestration actions by leading the firm's strategic initiatives" (p. 1408). For simplicity and consistency, we refer to *synchronized* activities to denote that they are temporarily aligned, while *orchestrated* activities imply a broader alignment spectrum (including a non-temporal, e.g., structural alignment).

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recognize opportunity or find means to exploit it, it inhibits many value-creating resource combinations (Holcomb et al., 2009). Chadwick, Super, and Kwon (2015, p. 361) argue that "to be effective, the resource management activities of managers at all levels of the firm must be carefully prioritized, synchronized, and supported—that is, orchestrated—by top management, particularly by the firm's chief executive officer (CEO)." From the managerial choice perspective, synergies emerge as a result of managerial orchestration efforts, and without it, these activities would not be complementary.

Therefore, we argue that a firm's systemic capability[4] to align its core strategic processes creates super-additive performance effects that exceed the sum of the marginal effects of adopting each orientation separately. Overall, SO complementarity is (a) *valuable* due to more effective bundling, deployment, and synchronization of the resources the firm controls, (b) *rare* because it is difficult to accomplish and maintain a concurrent consideration of diverse SOs, (c) *non-substitutable* because such resource orchestration implies a clear orientation toward the market, product, and anticipation of changes in both, and finally, (d) *inimitable* by competitors because it is grounded in interdependencies between the three SOs, which require greater managerial coordination and coupling (Holcomb et al., 2009). Therefore, SO complementarity is a knowledge-based strategic capability, spawning sustained competitive advantages (Hult et al., 2002; Hult & Ketchen, 2001), which should result in superior performance. Thus, we hypothesize the following:

> **Hypothesis 4 (H4):** *Entrepreneurial (4a), market (4b), and learning (4c) orientations are complementary in their relationship to firm performance.*

3 | METHODS

3.1 | Literature search

We collected data through a comprehensive and systematic search process. Searching in bibliographic databases, we used the following key terms and their variations: entrepreneurial orientation, entrepreneurial posture, corporate entrepreneurship, market orientation, and learning orientation. We closely studied the prominent conceptual and empirical reviews of these concepts (e.g., Ellis, 2006; Kirca et al., 2005; Lyon, Lumpkin, & Dess, 2000; Rauch et al., 2009; Zahra, Jennings, & Kuratko, 1999) and scanned their reference lists. Furthermore, we conducted an issue-by-issue search in the major management, marketing, and entrepreneurship journals.[5] In cases of incomplete data, we contacted the authors to obtain the data necessary for our meta-analysis. Our objective was to warrant representativeness and comprehensiveness of the final dataset.

We considered articles that met the following criteria: (a) empirical studies investigating at least one SO (i.e., entrepreneurial, market, or learning orientation), (b) studies indicating sample size and necessary outcome statistics, (c) studies assessing constructs at the firm level, and (d) studies examining for-profit organizations. Further, we only included articles written in English. To eliminate possible bias from the overrepresentation of certain studies, we identified articles with converging samples, and in each case, picked one providing the most relevant information and excluded the

[4]Complex systemic capabilities represent "aligned constellations of resources intended to accomplish a purpose" (e.g., superior firm performance) (Le Breton-Miller & Miller, 2015, p. 404).

[5]*Academy of Management Journal*, *Entrepreneurship Theory and Practice*, *Journal of Business Venturing*, *Journal of Management*, *Journal of Marketing*, *Journal of Small Business Management*, *Management Science*, *Organization Science*, *Strategic Entrepreneurship Journal*, *Strategic Management Journal.*

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other publications based on the same sample. In addition, we eliminated studies that did not provide any data on the bivariate relationships between the constructs building our research models. The study search and selection process yielded 761 effect sizes from 210 independent samples reported in 202 studies ($n = 48{,}593$) published between 1983 and 2016.

3.2 | Coding and measures

Two coders knowledgeable in SO research utilized a standardized coding protocol to extract the data (i.e., study characteristics and effect sizes) necessary for further analyses. Reliability checks were performed periodically throughout the coding process. During coder meetings, we discussed the differences in coding and made relevant adjustments in the protocol.

To assess possible measurement effects, we grouped the studies into subcategories based on the scales utilized to capture our constructs of interest. We captured if EO was measured with the original scale (Covin & Slevin, 1989), its extended version (Lumpkin & Dess, 1996), or any of its modifications (e.g., Calantone, Garcia, & Dröge, 2003). For MO, we used operationalizations developed by Kohli and Jaworski (1990) and Narver and Slater (1990), or a mix of both (Deshpandé & Farley, 1998). We also contrasted the measure of LO suggested by Sinkula et al. (1997) to all other organizational learning scales. For studies reporting results on SOs at the dimensional level, we used an overall (aggregated) measure by calculating an average across its dimensions (e.g., Palmatier, Dant, Grewal, & Evans, 2006). Another group of measurement sensitivity analyses captured the impact of performance scope: (a) financial (e.g., ROI, ROA, sales growth, gross margin, profitability, gross profit); (b) non-financial (e.g., product or service quality, customer satisfaction); or (c) mix (e.g., overall firm performance) as well as performance measure: (a) archival, (b) perceived, or (c) a combination of both.

To assess possible contextual effects, we coded the geographical region in which a particular study was conducted as follows: (a) North America, (b) South America, (c) Europe, (d) Asia, (e) Africa, and (f) Australia. For firm size, we distinguished between (a) small, (b) medium-sized, (c) large,[6] (d) mix-sized firms, and (e) not specified. Further, we coded the following industry categories: (a) manufacturing, (b) high-tech, (c) mixed, (d) other (i.e., banking, agricultural, and so on), and (e) not specified.

3.3 | Data analysis

Our methodological approach combines the correlational and performance approaches to complementarity testing (Aral et al., 2012; Brynjolfsson & Milgrom, 2012). The correlational approach focusses on the degree of interrelatedness between the three orientations, whereas the performance approach aims at establishing super-additive performance effects. This super-additivity—or complementarity—implies that adopting different SOs simultaneously should be more valuable than implementing them separately. Therefore, the interrelatedness between SOs serves as a necessary but insufficient condition for their complementarity. For this reason, in our study, the tests of interdependencies between the three orientations precede the assessment of the performance effects of complementarity.

[6]Note that subgroups may differ across geographical borders. To accommodate these cross-country differences, we utilized a flexible categorization scheme. A firm with 400 employees was coded as medium-sized in the United States or China, but as large in Switzerland or Greece.

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3.3.1 | Methodological approach to establish SO interdependence

Activities are interrelated if they affect the values or behaviors of each other (Pfeffer & Salancik, 1978). Empirically, we can capture such interrelatedness via the correlation between two variables. To establish SO interdependence, we (a) assessed the correlations between the three SO dimensions using meta-analytic techniques, and (b) estimated the joint performance effects of this interdependence using structural equation modeling (SEM). The artifact-corrected meta-analytic approach (Hunter & Schmidt, 2004) allowed us to integrate existing quantitative results and establish true corrected effect sizes (r) for the relationships under study. In this step, we tested Hypotheses 1, 2, and 3 regarding the direct relationships of EO, MO, and LO with firm performance. Subsequently, we calculated the strength of association between individual SOs (EO–MO, MO–LO, and LO–EO).

Specifically, to assess the strength of the bivariate relationships accurately, we corrected the effect size estimates for sampling and measurement errors. The correction for measurement error implied adjusting the correlation coefficients by the product of the square root of the reliabilities of the constructs. For studies not providing information on reliabilities of the constructs, we used the mean reliability across all studies that reported the reliabilities (Geyskens, Steenkamp, & Kumar, 1998). We also corrected for sampling errors to give greater weight to studies with more precise estimates. We performed our calculations using the random effects model in the Comprehensive Meta-Analysis 2.0 software (Borenstein, Hedges, Higgins, & Rothstein, 2005) and constructed a meta-analytic correlation matrix, including the weighted mean observed correlations of the pairwise relationships. The null hypothesis based on a random effects model tests an assumption that the mean true effect size equals to zero. A statistically significant Z-value indicates a 5% or less chance that the mean true effect size is equal to zero, and therefore, we can reject this hypothesis.

Following the recommendations of Geyskens, Krishnan, Steenkamp, and Cuha (2009), we applied the trim and fill procedure (Duval & Tweedie, 2000) to assess the potential effects of a publication bias. This procedure allows us to estimate the number of possibly missing studies, adds them to the sample, and recalculates the effect size (McDaniel, Rothstein, & Whetzel, 2006). We then considered the presence of potential outliers by observing the impact from the exclusion of each study from the analysis. Outliers represent cases when the mean-corrected correlations diverge more than two standard deviations from the effect sizes obtained when a particular study was included in the analysis.

Further, we assessed the dispersion of the effect sizes around the mean, comparing the Q-statistic with the critical value for a chi-square with $k–1°$ of freedom (Hedges & Olkin, 1985). A significant Q indicates a heterogeneous distribution, meaning that the variability among the effect sizes is greater than would be expected from sampling error alone, perhaps resulting from the differences associated with different study statistics (Lipsey & Wilson, 2001). To explain the systematic variance stemming from factors other than sampling error and consider the possible effects of moderators (both measurement and contextual), we relied on a mixed effects model and ran a series of sensitivity analyses. In comparison to the Q-test of total effects discussed above, a Q-test in the sensitivity analyses assesses the amount of variance between the subgroups. In this type of analysis, a significant Q-value implies that the subgroups differ from each other. Prior to assessing the bivariate relationships, we evaluated the internal consistency reliability of individual SO sub-dimensions based on the coefficient alpha reported in the studies from our database (Kinicki, McKee-Ryan, Schriesheim, & Carson, 2002). Thereby, we aim to ensure that SO "retains an overall coherence or consistency that is more than the sum of its foundational parts" (Suddaby, 2010, p. 351).

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In the second step, we estimated the extent of association of SO interdependence with firm performance, using SEM. SO interdependence was structured (A) as a *Common Effect Model*, a higher-order factor that captures MO, LO, and EO as a common shared core (MacKenzie, Podsakoff, & Jarvis, 2005), and (B) as a *Direct Effects Model* with covariations among the three orientations. We compared these two models to an *Independent Effects Model,* which assumes that the three dimensions do not covary in their effects on performance. Modeling interdependence as a reflective second-order construct implies high correlations between EO, MO, and LO, because these subdimensions each represent a common factor. In models of this type, only the common variance is attributed to the multidimensional construct, while the other types of variance (group, specific, and random) are considered part of the error variance (Law & Wong, 1999). Considering that not only the three orientations may share a common core, but also pairs of orientations (EO and MO, MO and LO, LO and EO) may share some group variances, we also assessed a Direct Effects Model with covariations among these three groups.

For model comparison, we relied on the MASEM approach, which represents a combination of meta-analysis and SEM (Bergh et al., 2016). As input into AMOS 22, we used the meta-analytic correlation matrix, including three SOs: firm performance, size, and age measures. Owing to the variation in the sample sizes of individual studies, to test our models, we used the harmonic mean across all studies, which equaled 7,096 (Viswesvaran & Ones, 1995). For the comparison, we relied on a chi-square test and multiple fit indices (Bergh et al., 2016); the comparative fit index (CFI) and the goodness-of-fit index (GFI), normed fit index (NFI), Tucker-Lewis Index (TLI, also known as the non-normed fit index) (Tucker & Lewis, 1973) and the standardized root-mean-square residual (SRMR). Moreover, we estimated the percent of variance in the DV explained by each model.

3.3.2 | Methodological approach to establish SO complementarity

Following the tests of SO interdependence, we tested the individual and joint actual performance contribution of the SOs. Specifically, we assessed complementarity by specifying the influence of (a) each orientation, (b) their two-way interactions, and (c) their three-way interactions on each of the observed orientation–performance correlations, separately.

To test these relationships, we relied on a SUR (Greene, 2007; Zellner, 1962) because it allows us to correlate the error terms and to simultaneously estimate their correlations and other coefficients. This approach accounts for the rich variation among the three SO–performance correlations, the observed SOs, and the control variables.

Specifically, the SUR system of equations was specified as follows:

$$\begin{aligned}\mathrm{EOperf_i} = {} & \beta_0^1 + \beta_1^1\mathrm{EO_i} + \beta_2^1\mathrm{MO_i} + \beta_3^1\mathrm{EOMO_i} + \beta_4^1\mathrm{EOLO_i} + \beta_5^1\mathrm{MOLO_i} + \beta_6^1\mathrm{EOMOLO_i} + \beta_7^1\mathrm{AME_i} \\ & + \beta_8^1\mathrm{EUR_i} + \beta_9^1\mathrm{MAN_i} + \beta_{10}^1\mathrm{TECH_i} + \beta_{11}^1\mathrm{SME_i} + \varepsilon_i^1\end{aligned} \quad (1)$$

$$\begin{aligned}\mathrm{MOperf_i} = {} & \beta_0^2 + \beta_1^2\mathrm{EO_i} + \beta_2^2\mathrm{MO_i} + \beta_3^2\mathrm{EOMO_i} + \beta_4^2\mathrm{EOLO_i} + \beta_5^2\mathrm{MOLO_i} + \beta_6^2\mathrm{EOMOLO_i} + \beta_7^2\mathrm{AME_i} \\ & + \beta_8^2\mathrm{EUR_i} + \beta_9^2\mathrm{MAN_i} + \beta_{10}^2\mathrm{TECH_i} + \beta_{11}^2\mathrm{SME_i} + \varepsilon_i^2\end{aligned} \quad (2)$$

$$\begin{aligned}\mathrm{LOperf_i} = {} & \beta_0^3 + \beta_1^3\mathrm{EO_i} + \beta_2^3\mathrm{MO_i} + \beta_3^3\mathrm{EOMO_i} + \beta_4^3\mathrm{EOLO_i} + \beta_5^3\mathrm{MOLO_i} + \beta_6^3\mathrm{EOMOLO_i} + \beta_7^3\mathrm{AME_i} \\ & + \beta_8^3\mathrm{EUR_i} + \beta_9^3\mathrm{MAN_i} + \beta_{10}^3\mathrm{TECH_i} + \beta_{11}^3\mathrm{SME_i} + \varepsilon_i^3\end{aligned} \quad (3)$$

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where for each study *i* in the data, $EOperf_i$, $MOperf_i$ and $LOperf_i$ denote the observed orientation–performance correlations in the study for each orientation. EO_i, MO_i, $EOMO_i$, $EOLO_i$, $MOLO_i$, and $EOMOLO_i$ are dummy variables that indicate the combination of orientations of each study *i* included in the analysis, (keeping LO as the baseline category[7] in the dummy set). AME_i and EUR_i are dummy variables that indicate whether the study was conducted in America or Europe (Asia being the baseline category). MAN_i and $TECH_i$ are dummy variables that indicate whether the study featured manufacturing or high-tech firms (mixed firms being the baseline category).SME_i denotes whether the firms in the study were SMEs (or large firms, the baseline category). Finally, ε_i^1, ε_i^2, and ε_i^3 are the error terms corresponding to each equation, which are uncorrelated across observations, but correlated across equations, and establish the relationship among the SO–performance outcomes.

When estimating the system in Equations (1)–(3), we tested for the role of complementarity in strategic interactions in two ways. First, by verifying the *joint* significance of the three-way interactions across each outcome (i.e., the null hypothesis: $\beta_6^1=\beta_6^2=\beta_6^3=0$); second, by verifying the significance of each estimate *separately* (i.e., the three null hypotheses $\beta_6^1=0;\beta_6^2=0;\beta_6^3=0$). To this end, an empirical challenge when applying the SUR approach to the data in our study was the prevalence of missing data in the observed SO–performance correlations. This is because not every study in the data featured every SO. Consequently, for each study in the data, the observed orientation–performance correlations are only those corresponding to the SOs therein. This requires the missing performance data to be imputed, that is, for values that plausibly represent the missing data to replace the missing values in the observed dataset (Little & Rubin, 1987; Tsikriktsis, 2005). Several techniques enable such an imputation. The most common include variable and/or observation deletion or univariate techniques, replacing missing data with the mean of the observed data, or with zeroes (Tsikriktsis, 2005). Techniques in which the observed data are sampled with replacement multiple times are also common, as well as regression approaches that estimate the most plausible value of the missing data, given the observed covariates (Gelman & Hill, 2006).

Each of these techniques has some limitations. For instance, when applied to multivariate patterns, mean or zero imputation can underestimate standard errors substantially. Furthermore, our data involve both continuous (the dependent variable) and discrete (the independent variables) data, while imputation methods generally focus on one or the other (Gelman & Hill, 2006). In addition, the imputation technique needs to rely on these multiple sources of variation, while accounting for the fact that the complementary relationship among the multiple outcomes includes several interactions, in determining plausible missing data values.

Considering the potentially complex patterns in the data, we employed an imputation technique known as MissForest, which could handle multiple data types while representing the data structure accurately (Stekhoven & Bühlmann, 2012). Utilizing the variation on the observed portions of the data, it iteratively estimates the unobserved portions on the basis of a series of random forest regressions. This technique is machine-learning-based (Breiman, 2001) and offers the advantage of robustness to simultaneously using variation from discrete and continuous data types. Furthermore, the procedure is non-parametric, which implies that the potentially complex joint distribution of the orientation–performance correlations may be more accurately recovered. Indeed, simulations show that the MissForest imputation technique substantially reduces errors than other imputation methods

[7]Every study recorded in the dataset had to feature either entrepreneurial, market, or learning orientation, or a combination of these. Consequently, a dummy variable set that includes the main, two-way, and three-way interactions, comprehensively describes every study in the data. Thus, including every such dummy in the regression analysis would induce an identification issue due to this linear independence, and one dummy (in this case, studies which featured only learning orientation) was removed from the specification and kept as the baseline category of the dummy set.

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TABLE 1 Meta-analytic summary statistics

	Zero-order correlation coefficients					
	1	**2**	**3**	**4**	**5**	**6**
1. Entrepreneurial orientation	*0.81*					
2. Market orientation		*0.84*				
ρ	0.500					
CI 95	(0.40: 0.59)					
k (N)	52 (13,773)					
3. Learning orientation			*0.83*			
ρ	0.501	0.651				
CI 95	(0.38: 0.60)	(0.57: 0.72)				
k (N)	27 (7,415)	23 (6,205)				
4. Performance				*0.85*		
ρ	0.334	0.386	0.386			
CI 95	(0.29: 0.37)	(0.35: 0.42)	(0.34: 0.43)			
k (N)	116 (32,692)	116 (27,481)	48 (11,583)			
5. Size					*1.00*	
ρ	0.081	0.071	0.080	0.137		
CI 95	(0.04: 0.12)	(0.01: 0.13)	(0.01: 0.15)	(0.09: 0.18)		
k (N)	64 (19,505)	42 (9,298)	19 (4,084)	93 (26,164)		
6. Age						*1.00*
ρ	−0.028	−0.008	0.017	0.029[a]	0.288	
CI 95	(−0.07: 0.01)	(−0.08: 0.07)	(−0.07: 0.10)	(−0.02: 0.08)	(0.21: 0.36)	
k (N)	43 (14,999)	12 (2,645)	9 (1,729)	52 (16,441)	45 (15,111)	

Italicized numbers indicate reliability coefficients. *ρ*: mean true score corrected correlation, *CI 95*: 95% confidence interval for ρ, *k:* the number of effect sizes; *N:* total observations.

[a]$r = .085$, *95% CI* (0.03: 0.14), 12 studies added a result of the trim and fill analysis.

(Stekhoven & Bühlmann, 2012).[8] Therefore, we estimated the SUR system in Equations (1)–(3) using data imputed by the MissForest algorithm.

4 | RESULTS

Table 1 depicts the summary statistics of our database, including mean-corrected effect sizes, their confidence intervals, and results of the publication bias analysis.

[8]Appendix E, Supporting information, includes more details on this imputation approach, comparison of other imputation techniques, details on parameter estimation, and an assessment of the robustness of our results across multiple imputation techniques.

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In meta-analyses, confidence intervals indicate the range within which the population mean is likely to fall based on the observed data (Lipsey & Wilson, 2001). Intervals excluding zero indicate that these bivariate relationships are statistically significant.

4.1 | Direct performance effects of the strategic orientations

For the relationships between the individual SOs and firm performance, we obtained significant, positive reliability-corrected mean correlations: EO ($r = .33$, $p < .05$), MO ($r = .39$, $p < .05$), and LO ($r = .39$, $p < .05$). Thereby, we find support for Hypotheses 1, 2, and 3, respectively. Interestingly, our findings reveal that firm performance is positively correlated with firm size ($r = .14$, $p < .05$), but unrelated to firm age ($r = .03$, *n.s.*). However, the correlation between size and age is positive ($r = .29$, $p < .05$).

To better understand the mechanisms that drive the relationships between the individual SOs and firm performance, we performed sensitivity analyses (see Web-appendices A, B, and C) and investigated the effects of different measurement (i.e., performance scope, performance measure, scale used to measure the relevant construct) and contextual variables (i.e., geographical location, firm size, firm industry, journal ranking). Our results show that the measure of performance scope has a significant impact on the strength of the EO–performance relationship ($Q = 15.48$, $p < .001$). Specifically, the effect is higher when non-financial ($r = .47$) or mixed performance indicators are utilized ($r = .37$) in comparison to the financial measures of firm performance ($r = .27$). We obtained a similar result for the MO–performance relationship ($Q = 15.27$, $p < .001$); studies using mixed

performance measures had significantly higher effects ($r = .49$) than those that captured performance based on financial ($r = .34$) and non-financial indicators ($r = .35$). For the LO–performance relationship ($Q = 6.86$, $p < .05$), higher effects were observed when researchers used non-financial performance indicators ($r = .48$) than financial or mixed measures ($r = .36$ and $r = .35$, respectively). Further, the EO–performance relationship is sensitive to the type of performance measure applied ($Q = 5.91$, $p < .05$). The average correlation is significant and higher for studies relying on subjective measures ($r = .35$) compared with objective ($r = .20$) performance measures. Although our analysis indicated marginally higher performance effects of LO ($r = .40$) when performance was captured with subjective measures, the result in the other subgroup (objective performance) was not statistically significant, and therefore, this difference cannot be meaningfully interpreted. We did not find any differences in the results depending on the scales utilized to capture EO, MO, and LO. The effect sizes of various operationalizations of these constructs are similar in magnitude. For example, the mean effect size for the EO–performance relationship measured using Covin and Slevin's (1989) scale ($r = .32$) is comparable to the results obtained with other EO scales ($r = .38$). Although this relationship seems weaker in studies relying on Lumpin and Dess' (1996) measure of EO ($r = .22$), this difference is not significant. Similarly, the mean effect size for the MO–performance relationship measured using the MARKOR scale ($r = .36$) does not vary from the results obtained using the MKTOR scale ($r = .37$).

Besides comparing different measurement scales, we estimated the internal consistency of the individual orientations based on the Cronbach's alpha values reported in the original studies (Kinicki et al., 2002). In the 130 samples capturing the EO construct, the mean reliability reached .81 (SD= .06, ranging between .62 and .93). From 125 samples measuring MO, the mean reliability was .84 ($SD = .07$, range .56–.97). The reliability of the LO construct across 50 samples was .83 ($SD = .08$, range .65–.95). In summary, the individual SO dimensions exhibit high internal consistency reliability.

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Further, we assessed contextual effects and found that these do not seem to drive the EO–performance and MO–performance relationships; the results are consistent across different geographical locations, firm sizes, industries, and not influenced by the studies' publication outlets. For the LO–performance relationship, we found marginally significant sensitivity to industrial setting ($Q = 6.00$, $p < .10$). The association between LO and performance is stronger in manufacturing firms ($r = .46$) than in high-tech ($r = .33$) or in the cross-sectional samples ($r = .36$). Additionally, our analysis reveals that small ($r = .35$) and medium-sized ($r = .32$) firms benefit significantly less from LO than large ($r = .53$) or mix-sized ones ($r = .43$).

4.2 | Interrelatedness of the strategic orientations and its joint performance effect

Our results show that individual orientations are highly interrelated; the mean-corrected correlations reached .50 for EO–MO, .50 for EO–LO, and .65 for MO–LO. Next, we assessed the joint performance effects of these constructs. Based on the data from Table 1, we performed SEM analyses and evaluated the hypothesized models. The results of our analyses are summarized in Tables 2 and 3 and in Figure 1 (Appendix D, Supporting information).

The Independent Effects Model (1) excluded covariances between the three orientations and did not fit our data well (χ^2/df = 729.67, CFI = .25, GFI = .76, NFI = .25, TLI = −.24, SRMR = .23). The Direct Effects Model (2) with covariances between the three orientations entails the direct effects of EO, MO, and LO on firm performance and shows a good model fit (χ^2/df = 14.97, CFI = .99, GFI = .99, NFI = .99, TLI = .98, SRMR = .03). The performance impact from all individual dimensions is statistically significant ($\beta = .14$, $p < .001$ for EO, $\beta = .19$, $p < .001$ for MO, and $\beta = .19$, $p < .001$ for LO) and the three SOs jointly explain 20% of the variance in firm performance. This result provides additional support for Hypotheses 1, 2, and 3. Not only is there a positive correlation between the three SOs and firm performance, but also each orientation explains a significant amount of variance in firm performance.

The Common Effect Model (3) captured the shared performance effects of SOs. It fit our data equally well (χ^2/df = 13.03, CFI = .99, GFI = .99, NFI = .99, TLI = .98, SRMR = .03), as the Direct Effect Model. This indicates that individual dimensions are significant indicators of the overall SO the multidimensional strategic construct. This orientation (a) is strongly associated with superior firm performance ($\beta = .48$, $p < .001$) and (b) explains 24% of the variance in the dependent variable. Interestingly, in both models, firm performance is positively correlated with firm size ($r = .10$, $p < .001$) and unrelated to firm age ($r = .00$, *n.s.*), whereas the covariance between size and age

TABLE 2 SEM results for Direct Effects Model

	Coefficient	*SE*	95% CI	*t* value	*p* value
EO → performance	0.139	0.013	0.12–0.16	10.94	< 0.001
MO → performance	0.189	0.014	0.16–0.21	13.06	< 0.001
LO → performance	0.186	0.014	0.17–0.21	12.83	< 0.001
Size → performance	0.096	0.011	0.08–0.12	8.73	< 0.001
Age → performance	0.003	0.011	−0.01–0.02	0.31	0.755

Notes: Model fit: $\chi^2(6) = 89.798$, $p < 0.001$. CFI = 0.99; GFI = 0.99; NFI = 0.99; TLI = 0.98; SRMR = 0.03.
Abbreviations: 95% CI, confidence interval for coefficient; CFI, comparative fit index; GFI, goodness-of-fit statistic; NFI, normed fit index; SRMR, standardized root mean square residual; TLI, Tucker-Lewis index.

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TABLE 3 SEM results for Common Effect Model

	Coefficient	*SE*	95% CI	*t* value	*p* value
SO → EO	0.627	0.012	0.61–0.64	53.33	< 0.001
SO → MO	0.805	0.011	0.79–0.82	71.13	< 0.001
SO → LO	0.805	0.011	0.79–0.82	71.18	< 0.001
SO → performance	0.480	0.012	0.46–0.50	39.22	< 0.001
Size → performance	0.098	0.011	0.08–0.12	8.86	< 0.001
Age → performance	0.001	0.011	−0.02–0.02	0.13	0.893

Notes: Model fit: $\chi^2(8) = 104.251$, $p < .001$. CFI = 0.99; GFI = 0.99; NFI = 0.99; TLI = 0.98; SRMR = 0.03.
Abbreviations: 95% CI, confidence interval for coefficient; CFI, comparative fit index; GFI, goodness-of-fit statistic; NFI, normed fit index; SRMR, standardized root mean square residual; TLI, Tucker-Lewis index.

remains positive and strong ($r = .29$, $p < .001$). Following the recommendations of Bergh et al. (2016), we assessed the relative fit of the models and found significant differences between Model 1 (Independent Effects Model) and Models 2 and 3 (Direct and Common Effect). Although Models 2 and 3 fit our data Equally well, a chi-square test indicates the superiority of the Common Effect Model over the Direct Effects Model ($\Delta\ \chi^2(2) = 14.45$, $p < .001$) (Tables 2 and 3). Therefore, we establish the interdependence of SOs in their relationship to firm performance.

4.3 | Assessment of complementarity of the strategic orientations

To assess whether the three SOs complement each other in their relationship to performance, we first imputed the data for further analysis, using the MissForest algorithm (Stekhoven & Bühlmann, 2012). The distribution of the imputed data was not significantly different to the observed data, as indicated by Kolmogorov–Smirnov tests on each of the three orientation variables (exact *p*-values: .98, .61, and .62 for EO, MO, and LO, respectively), and neither imputed dataset contained outliers or "nonsensical" data, which might warrant further scrutiny (Gelman & Hill, 2006). Therefore, we consider the imputed data using the MissForest approach to be an accurate representation of the SO–performance link and use it in the subsequent analyses.

To estimate the SUR model specified in Equations (1)–(3), we used 197 samples from the dataset after imputation. At this point, we excluded the samples that did not capture firm performance from the analysis. The results are shown in Table 4. A Breusch–Pagan test of independence for the SUR analysis indicates that the outcome equations are significantly related to each other ($\chi^2(3) = 304{,}52$, $p < .001$), and thus, the use of the SUR approach is adequate. Furthermore, the largest Variance Inflation Factor (VIF) amounts to 4.43, with the average VIF in the model being 2.02. This suggests that there is no collinearity problem among the explanatory variables in the system of equations (Greene, 2007).

Table 4 contains the results of a simultaneous parameter estimation along the system of Equations 1–3. Each set of coefficients corresponds to a set of dummy variables, for each, the coefficients must be interpreted in comparison to the corresponding baseline group. In particular, as discussed previously, for the set of interactions concerning the three SO dimensions, the learning orientation dummy variable is used as baseline, as it is the orientation with the fewest observations (48) in the data.

The results support our assumption that SO complementarity is associated with higher performance, after controlling for other factors. First, the joint hypothesis test provides evidence that the

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TABLE 4 SUR results for multivariate complementarity model

	EO–performance			MO–performance			LO–performance		
Variable	**Estimate**	***SE***	***p* value**	**Estimate**	***SE***	***p* value**	**Estimate**	***SE***	***p* value**
EO	−0.094†	0.051	0.067	−0.075	0.046	0.106	−0.039	0.031	0.217
MO	−0.030	0.049	0.539	−0.032	0.044	0.465	0.003	0.030	0.915
LO	0 (base)	–	–	0 (base)	–	–	0 (base)	–	–
EO*MO	0.051	0.062	0.414	0.025	0.056	0.650	0.012	0.038	0.757
EO*LO	0.036	0.059	0.543	0.044	0.053	0.409	0.018	0.036	0.611
MO*LO	0.059	0.064	0.356	0.036	0.058	0.531	0.023	0.039	0.554
EO*MO*LO	0.213**	0.070	0.002	0.149*	0.063	0.018	0.062	0.043	0.146
Location: America	−0.080**	0.030	0.008	−0.056*	0.027	0.040	−0.058**	0.019	0.002
Location: Europe	0.026	0.030	0.376	−0.046†	0.027	0.086	−0.062**	0.018	0.001
Location: Asia	0 (base)	0 (base)	0 (base)	0 (base)	0 (base)	0 (base)	0 (base)	0 (base)	0 (base)
Industry: Manufacturing	−0.002	0.030	0.940	−0.005	0.027	0.858	0.036†	0.018	0.052
Industry: High tech	−0.043	0.042	0.304	−0.043†	0.037	0.255	−0.033	0.025	0.195
Industry: Mixed	0 (base)	–	–	0 (base)	0 (base)	0 (base)	0 (base)	0 (base)	0 (base)
Size: SME	0.013	0.031	0.664	−0.033	0.028	0.227	−0.017	0.019	0.358
Size: Large	0.106*	0.045	0.018	0.036	0.040	0.370	0.097***	0.027	0.000
Size: Mixed	0 (base)	0 (base)	0 (base)	0 (base)	0 (base)	0 (base)	0 (base)	0 (base)	0 (base)
Intercept	0.386***	0.049	0.000	0.441***	0.044	0.000	0.393***	0.030	0.000
R^2	13.68%			10.78%			22.36%		

Notes: $N = 197$. Avg. VIF = 2.02. Significant estimates marked with †$p < .1$; *$p < .05$; **$p < .01$; ***$p < 0.001$. Breusch-Pagan test suggests the SUR equations are not independent ($\chi^2(3) = 304.52$, $p < .001$). Joint test of significance of EO*MO*LO effect across orientations is significant ($\chi^2(3) = 10.47$, $p < .05$.

effect of all three SOs is significant across all orientations ($\chi^2(3) = 10.47$, $p < .05$). This can be thought of as preliminary evidence in the form of an omnibus test. Second, interestingly, we find that the effect of the three-way complementarity is significant and positive for EO ($\beta = .21$, $p < .01$) and MO ($\beta = .15$, $p < .05$); however, no evidence is found for LO ($\beta = .06$, $p > .10$). Furthermore, firm size also plays a role in shaping performance, with large firms, as compared to mixed firms, exhibiting a positive effect on entrepreneurial ($\beta = .11$, $p < .05$) and learning ($\beta = .10$, $p < .001$) orientation performance.[9]

Besides assessing the notion of complementarity, a relevant question is whether such complementarity substantially helps explain the SO-correlations in the study. However, such a test cannot be performed on the SUR simultaneous system of equations. To address this question, and given this limitation, we performed separate hierarchical regression analyses on each of the three SO–performance correlations. In each regression, the first covariate group corresponded to the controls; the second to the SO dimension main effects; the third, to the two-way interactions; and the last to

[9]Note that the results of the subgroup analysis and SUR regression are interpreted separately because the former explores performance effects from *one* orientation, whereas the latter estimates the effects firm *all three* SOs simultaneously. In addition, our subgroup analyses incorporate both measurement and contextual moderators, whereas the SUR only incorporates contextual ones.

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TABLE 5 Test of R-square change for each variable group (hierarchical regression)

Group	EO-performance correlations	MO-performance correlations	LO-performance correlations
Controls	0.060†	0.057†	0.191***
SO main effects	0.020	0.011	0.019
SO two-way interactions	0.016	0.015	0.005
SO three-way interactions	0.041**	0.025*	0.008
Total model R^2	13.68%	10.78%	22.35%

Notes: $N = 197$. Significant estimates marked with †$p < .1$; *$p < .05$; **$p < .01$; ***$p < .001$. Controls figures denote baseline R-square when only Controls are added. Every figure thereafter represents the increase in R-square resulting from that variable group.

the three-way interaction. Using this framework, we sought to determine whether there was a statistically significant increase in the explanatory power of the model(s), as each group was incorporated into the estimation.

Table 5 presents the results of the hierarchical regression analyses. The first group of variables is used to estimate the amount of variance (actual R-squared) from regressing the dependent variable in question on all control. Subsequent numbers represent the gain in R-squared when adding the corresponding variable group: SO main effects, two- and three-way interactions. As can be seen, the three-way interaction variable group produces a significant increase in R^2 for EO and MO, suggesting that the three-way complementarity of SO dimensions can indeed be linked to higher performance across these orientation–performance correlations.

However, LO–performance correlation bears further discussion, as in this case, the control variables are significant ($\beta = .19$, $p < .001$), but not the three-way interaction. Furthermore, as shown in Table 4, firm size ($\beta = .10$ $p < .001$) and geographical location ($\beta = -.06$, $p < .01$ for American studies and $\beta = -.06$, $p < .01$ for European studies) appear to strongly drive the LO–performance correlation outcome. Consequently, the results of our analysis suggest that whereas the link between EO and MO and performance is primarily due to the complementarity of the three SOs (H4a and H4b supported), the LO–performance link seems to be driven by firm size and other considerations (H4c not supported).

To test the robustness of our results, we imputed the data using four alternative methods: zero, mean, random sample, and regression imputations. In the Web-appendix, we compare the similarity of the resulting distributions to the original data, and test the multivariate SUR model using these four additional imputed datasets. Although the four other potential imputation methods do not represent the data as adequately as the MissForest imputation method, the results of this section, highlighting the importance of the SO complementarity, are robust to employing these other imputation methods.

5 | DISCUSSION

EO, MO, and LO are established facets of the strategy construct in the business field, and the interrelatedness of these SOs has encouraged much theoretical and empirical research. Completing each other, these orientations have the potential to reduce blind spots in firms' strategy making (Baker & Sinkula, 2009; Hart, 1992; Hult & Ketchen, 2001; Wales et al., 2018). Our study provides deeper

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insights into the interrelatedness of the three SOs and develops rationales for their complementarity, that is, the super-additivity of their performance effect, by drawing on the extended RBV and the resource orchestration frameworks (Barney et al., 2011; Sirmon et al., 2011). Building on aggregated results from 210 samples published in 202 studies, we meta-analytically summarize more than 30 years of research on EO, MO, and LO.

5.1 | Research contributions and implications

We view EO, MO, and LO as a cohesive firm-level strategic ability, which is positively related to firm performance. Adopting a complex view of complementarity, we test for both the interrelatedness and complementarity of SOs. Our findings reveal that the three orientations are highly interrelated (with all bivariate mean correlations above .50), and that the performance effect of an overarching SO is larger ($\beta = .48$, $p < .001$) than from any of its individual dimensions (e.g., $\beta = .19$, $p < .001$ for MO). We quantify complementarity between the three orientations and document that it explains an additional 4.1% of the variance in the EO–performance relationship and an additional 2.5% of the variance in MO–performance (Table 5). For example, for EO, the three-way complementarity alone explains almost 30% of its relationship with performance (4.1% divided by 13.68%, Table 5).

Despite high interdependence between all groups of orientations, SO complementarity is driven primarily by EO and MO. This implies that superior performance is associated not with a firm's ability to learn in the first place, but rather with its ability to select product and market domains where learning would be beneficial. A failure to recognize changes in the market conditions or shifts in customer preferences while developing new products may hamper their commercialization or lead to suboptimal make-or-buy decisions (in-house R&D vs. licensing a technology). To effectively manage a firm's resources, managers need to go beyond isolated actions of environment scanning or product development or outsourcing, and integrate these activities systematically. This finding contributes to the literature on firm-level complementarities (Porter & Siggelkow, 2008; Tanriverdi & Venkatraman, 2005) and frames interdependence as a prerequisite for their emergence.

Second, we advance the RBV by formalizing skillful resource orchestration (Sirmon et al., 2011) as a mechanism that creates synergetic effects of highly interdependent resources and capabilities. This finding reinforces the extended RBV and implies that the alignment of resources and capabilities has the potential for super-additive effects on performance, as opposed to their sole possession (Adegbesan, 2009). This also contributes to the strategic theory of the firm (Rumelt, 1984), which is concerned with the "exploitation of existing corporate assets, but also (…) the emergence, development, and demise of new resources and capabilities" (Stieglitz & Heine, 2007, p. 1). Indeed, the aim of achieving complementarity serves as a motor to enter new markets, facilitates continued success at different stages of the industry life cycle, and as such, leads to sustainable competitive advantages (Harrison, Hitt, Hoskisson, & Ireland, 2001; Mowery, Oxley, & Silverman, 1998; Teece, 1996; Wernerfelt, 1984). We contribute to understanding how complementarity between three generic SOs can lead to sustainable competitive advantages. Besides managerial efforts, complementarity is rooted in the inherent properties of activities that by nature tie resources and capabilities together. These processes may be anchored in the organizational culture and structure.

Third, we advance the extant approaches of complementarity testing in management research, such as testing of interaction effects in SEM (e.g., Mu & Di Benedetto, 2011; Tanriverdi & Venkatraman, 2005) or commonality analysis (Wales et al., 2018). Specifically, relying on the SUR to analyze meta-analytic data, we are able to draw conclusions regarding the synergetic effects of the three SOs. This method allows us to capture variation in three dependent variables simultaneously

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(Zellner, 1962), and to compare alternative models, building on cumulative research findings (Bergh et al., 2016). The evidence from a broad database of empirical studies clearly demonstrates that the super-additive value creation potential arises from a combination of different orientations. Other studies on complementary and interdependence might also use an integration of SUR and MASEM. Additionally, to the best of our knowledge, this is the first meta-analytic study that employs data imputation to infer the likely values of the dependent variable, when studies do not include all the required features in a meta-analysis. The imputation procedure allowed us to formally test the joint role of orientation complementarity on the three orientation–performance dependent variables, and to conclude that such complementarity drives performance. We employed a recent machine-learning imputation technique (MissForest) and demonstrated how, although the complementarity result is robust to using other techniques (zero, mean, regression, and random-sample imputation), these induce biases into the imputation procedure. We believe this imputation approach can be useful for further meta-analytic research, where missing data are a methodological challenge, and where the use of zero or mean imputations can induce serious biases.[10] Indeed, recent advances in the applications of the statistical approaches to meta-analytical data, such as the use of Monte-Carlo methods for assessing mediation when raw data are unavailable, demonstrate an increased complexity of questions that meta-analyses can examine (Jeong & Harrison, 2016).

Fourth, this study highlights the impact of the measurement and contextual aspects on the results of empirical studies on SO. Strategy scholars should explore a variety of performance measures (both financial and non-financial), whereas the application of only one data source might over- or understate the strength of the relationships under investigation. Additionally, our findings imply a difference in the EO–performance relationship strength, based on the source of the performance data; the effects appear to be weaker when objective performance measures are applied, which confirms the results of other meta-analyses (e.g., Karna, Richter, & Riesenkampff, 2016). We suggest that researchers should balance their data collection efforts and be aware of the downsides of objective data. On the other hand, despite multiple contextual differences between the studies in our dataset, the performance effects of the three SOs hold across a variety of geographical and industrial settings.

Next, our model testing revealed that although firm age is not associated with superior performance, it co-varies with firm size (cov = .29, $p < .001$), and the latter has a significant and positive effect on firm performance ($\beta = .10$, $p < .001$). While our findings support an inherent assumption that larger firms tend to be older because it takes time to grow, the varying effects of size and age raise some questions. Researchers widely agree that younger firms are prone to the "liability of newness," expressed in the greater risk of failure than older organizations (Freeman, Carroll, & Hannan, 1983; Stinchcombe, 1965). Simultaneously, young firms that manage to overcome this liability and accumulate substantial assets to fuel their growth, establish themselves as technology and innovation leaders, outperforming more mature firms (Rosenbusch, Brinckmann, & Bausch, 2011). A closer examination of the relationship between failure and firm age by Thornhill and Amit (2003, p. 505) revealed that "it is not youth or age that causes failure," but rather firms of different ages vary in their reasons for failure: younger firms go out of business due to lack of adequate resources and capabilities, whereas older ones fail as a result of misfit between the resources and demands of the competitive environment. Therefore, survival and success depend on the ability of the younger firms to overcome the liability of newness and of the older firms to manage transformation when environmental changes occur. Therefore, our finding that firm age is not directly linked to superior performance is in line with prior research, and highlights the need to explore the non-linearity of this

[10]Note that the suggested method of data imputation should not be used in the analyses of the bivariate relationships or MASEM; however, we argue that this approach can be applied in an SUR.

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relationship. On the other hand, the positive relationship between firm size and performance supports the notion that larger firms tend to be more successful, although this relationship might be prone to an endogeneity problem. Nevertheless, we strongly feel that the results of our study are not biased because we delineate between the number of employees (firm size) and an increase in the number of employees (firm growth as a non-financial performance measure) and control for the effects of firm size in our model testing.

Practitioners should consider that a firm's SO emerges as a result of an alignment between entrepreneurial, market, and learning activities, and creates superior value for a firm. Its performance potential cannot be fully revealed when these orientations are present but misaligned. For example, a lack of market information about a new target customer group cannot be compensated with extensive knowledge about the current users of an existing product. Similarly, a firm that plans market entry with an innovative product should not rely on information about existing customers if their product was geared toward a different target audience. Therefore, managers should focus on matching one orientation to the other(s). This need to leverage capabilities increases complexity requiring the installation of appropriate incentives and objectives, which would serve as guideposts for managerial behavior (Stieglitz & Heine, 2007).

5.2 | Limitations and future research

One has to be aware of certain limitations when assessing the findings of our study. First, representing a synthesis of prior research, a meta-analysis inherently subsumes the limitations of the studies on which it is built. Most importantly, there is a potential bias in the strength of relationships due to method variance and use of self-reported, single-source data for dependent and independent variables in some studies. For example, even in the absence of an actual alignment, respondents might want to maintain consistency (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003) and fill in the gaps to link the three activities together. An increase in the use of secondary sources to capture firm performance and SOs could resolve this issue. Few studies in our sample have relied on indices as proxies for EO (Miller & Le Breton-Miller, 2011) or MO (Foreman, Donthu, Henson, & Poddar, 2014). Indeed, more studies utilized secondary sources to capture performance. With our subgroup sensitivity analyses, we partially account for the difference in types and sources of data collection. In addition, most studies in our sample were drawn from cross-sectional data, and therefore, do not allow any inferences about causality in the relationships. However, by aggregating a vast amount of data over more than three decades, we are able to provide a well-balanced perspective on the relationships under study.

Further, we are limited in the ability to rule out possible conceptual overlaps between the three SOs, because managerial strategic alignment is partially embedded in the individual orientations. For example, inter-functional coordination (a dimension of market orientation) and shared vision (a dimension of learning orientation) imply a cross-departmental alignment of efforts. On the other side, these overlaps seem to be in line with the concept of reciprocal interdependence of SOs (Thompson, 1967), where organizational units feed their work back and forth among themselves. We argue that the current approach to measure individual SOs using additive or average measures does not reliably seize a capability to align multiple orientations. Subsequently, if a study captures MO using a mean scale, a firm with high customer and competitor orientation but low inter-functional coordination obtains the same scale score as a firm with moderate scores across all dimensions. Similarly, an open-minded firm that is highly committed to learning, but scores low on shared vision, will have the same mean LO as a firm with moderate values in the three dimensions. Therefore,

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researchers need to consider EO, MO, and LO *simultaneously* to establish alignment and complementarity between them. Alternatively, they can use multiplicative constructs, as suggested by Slevin and Terjesen (2011), or develop an SO scale that accounts for meaningful reciprocities.

Guided by the work of Porter and Siggelkow (2008), we assert that SO complementarity can be grounded in the inherent properties of activities as well as in managerial choices. Yet, our analysis was limited to variables that were available in existing studies and provided enough observations with other variables of interest. Hence, we were unable to empirically delineate between managerial choices to align SOs and organizational culture, which naturally weaves orientations together. From the three orientations, only MO has formally been captured as a behavioral (MARKOR, Kohli & Jaworski, 1990) and cultural (MKTOR, Narver & Slater, 1990) construct. Yet, in essence, the MARKOR scale reflects various intelligence-generating activities, while the MKTOR scale focuses on the sources of this intelligence (customer orientation, competitive orientation, and inter-functional coordination). Thus, future research can target the development of scales that capture the differences and overlaps between SOs as managerial choices, as opposed to inherently interrelated activities. For example, Chadwick et al. (2015), in their study of resource orchestration, distinguish between a chief executive officer's (CEO) *emphasis* on strategic human resource (HR) management and a commitment-based *HR system.* They capture both managerial choices and inherent properties of the system. For SO, this would imply capturing a CEO's orientation toward entrepreneurship, marketing, and learning, as well as the firm's strategic system of interactions between the departments of marketing, R&D, and HR.

Additionally, although we frame managerial choices and inherent properties of SOs as sources of complementarity, further research is necessary to empirically validate their relationships. We assume that managers, as organizational architects, install practices and processes that foster interrelatedness between EO, MO, and LO. Over time, these practices become deeply rooted in organizational culture. Therefore, inherent alignment emerges as a result of specific managerial choices. Multi-level organizational studies can further clarify the aspects of effective leadership that create synergetic routines both at the departmental level as well as between individual employees. As we know from prior research, behavioral integration is multilevel in origin (Simsek, Veiga, Lubatkin, & Dino, 2005).

From a contingency view, there is no universal way to manage organizations. Rather, a careful management and alignment of SOs to the specific environmental demands is crucial for performance (Miller & Friesen, 1982). Facing major shifts in the environment, the attention patterns of managers might change sharply. Specifically, Cho and Hambrick (2006) have found that members of the top management team (TMT) pay attention to bundles of stimuli rather than to piecemeal stimuli. An example of such a bundle would be noticing and interpreting environmental changes around them (LO), conducting environmental scanning (MO), and generating strategic initiatives (EO). Moreover, changes in TMT composition or compensation amplify this shift in attention. Researchers studying these processes might benefit from adopting an attention-based view on SOs (Ocasio, 1997)[11] and scrutinizing focal relationships at the individual, group/team, and firm levels. As our theoretical arguments suggest, SO complementarity emerges from managerial choices to align these orientations as well as from their inherent internal alignment. The motivation for this alignment comes from the need to solve two major organizational challenges: (a) coordination in the use of existing resources and in the creation of new assets, and (b) cooperation of employees. According to Stieglitz and Heine

[11]SOs can be framed as firm culture or as organizational choice driven by the behavior of its members (TMT or employees) (Noble et al., 2002). However, we define SO more broadly for the purposes of our study, as a firm-level strategic capability to align orientations toward entrepreneurship, marketing, and learning.

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(2007), a clear strategic direction, formal structures, and the creation of complementarities between assets allow firms to overcome these challenges.

Specifically, when change in the constellation of complementary assets is necessary (e.g., when entering new markets), managers need to dynamically provide strategic direction, rather than stick to formal rules and objectives (Stieglitz & Heine, 2007). Hence, researchers should study situations when environmental conditions change, and managers need to shift their attention and institute behavioral changes to realigning SOs. In this endeavor, insights from the agency theory (Jensen & Meckling, 1976) bear the potential of explaining why SO misalignment might emerge as a lack of managerial motivation to institute this alignment, as opposed to their capability to do so. In their recent study of acquisition investments, Steinbach, Holcomb, Holmes, Devers, and Cannella (2017) explored various types of incentives that enable the alignment of interests between firm managers and stakeholders. Insights about managerial reactions to incentives will help firm owners design a system that achieves synergetic effects of SO.

Future research also needs to establish the boundaries of SO complementarity and assess system vulnerability and sensitivity to misalignment of the orientations over time. Firm capabilities are idiosyncratic and path dependent in nature, which makes them difficult to copy and imitate; however, simultaneously, increases coordination complexity and costs. Le Breton-Miller and Miller (2015, p. 405) urge managers to keep in mind that "[a] chain of causal links is only as robust as its weakest connection." Yet, it remains unclear if there is a certain threshold at which synergetic effects disappear and/or turn into substitutes. Porter and Siggelkow (2008) argue that might happen when firm strategies or environmental conditions change. Therefore, one potential thrust would be to examine organizational catalysts, facilitators of, and barriers to such flip. Additionally, future research could investigate the impact of a firm's stage of development, as well as market and economic conditions on SO complementarity. For example, researchers may explore processes by which startup founders establish and orchestrate SO complementarity. Furthermore, they can capture how, under conditions of high environmental turbulence, managers disrupt established patterns of behavior and change existing practices of alignment between these orientations. On the contrary, SO interrelatedness in established firms or in stable environments may be maintained as an inherent characteristic of the orchestrated and integrated organizational units. Specifically, we call for research on complementarities that emerge by decision and are maintained by design.

In conclusion, we highlight that SO complementarity is a critical resource for many firms striving for sustained competitive advantage. Demonstrating SO interdependencies and complementarity, our findings affirm that firms benefit more from a multi-mode SO than from each of them separately.

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