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Moderation of OM practice effectiveness by organizational culture profile: contingency vs paradox perspective

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Abstract

Purpose – This paper investigates how a firm's organizational culture profile (configuration of organizational culture types) influences the effectiveness of operations management (OM) practices in improving their targeted outcomes.

Design/methodology/approach – We developed alternative hypotheses based on contingency and paradox perspectives to predict the effectiveness of OM practices in dominant (one prevalent organizational culture type) vs eclectic (opposing organizational culture types at a similar level) organizational culture profiles. They were tested using data from over 7,000 respondents across 330 manufacturing plants in 15 countries.

Findings – Consistent with contingency theory, OM practices oriented toward innovation are more efficacious in plants with an adhocracy-dominant organizational culture profile and practices targeting supply chain (SC) control are less effective in a clan-dominant organizational culture profile. Consistent with paradox theory, OM practices oriented toward efficiency or SC control are more effective in plants with an eclectic organizational culture profile.

Practical implications – This study offers relevant practical implications regarding the effectiveness of various OM practices, whether they are used in an aligned dominant organizational culture profile or in an eclectic organizational culture profile.

Originality/value – Previous research on organizational culture provides a limited understanding of the effectiveness of OM practices in the presence of strategic tensions, such as opposing organizational cultures or opposing targeted outcomes. This research concludes that the validity of the contingency or paradox perspective depends on strategic tensions faced, with important implications for research and practice.

Keywords Organizational culture, OM practice effectiveness, Performance outcomes

Paper type Research paper

1. Introduction

Organizational culture is comprised of values shared by a firm's employees (Cameron and Quinn, 2011; Marshall *et al.*, 2016). Operations management (OM) scholars have focused on aligning organizational culture and OM practices (Naor *et al.*, 2008; Canato *et al.*, 2013; Gambi *et al.*, 2015), with extant research providing insights about which organizational culture types align with specific OM practices, including supply chain (SC) integration (Wu *et al.*,

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2013; Cao *et al.*, 2015), total quality management (Valmohammadi and Roshanzamir, 2015), Lean (Bortolotti *et al.*, 2015a) and other practices. Culture types aligned with specific OM practices can facilitate both practice adoption and effectiveness (moderate the relationship between OM practices and performance outcomes) (Marshall *et al*., 2016) with the latter being the focus of this research.

However, as business environments become increasingly complex and competitive, firms must deal with strategic tensions that are sometimes incompatible (Smith and Lewis, 2011; Zhang *et al.*, 2021). For example, strategic tensions surface due to simultaneously pursuing opposing outcomes (Lewis and Smith, 2014), such as efficiency vs innovation (Prajogo and McDermott, 2011) or implementing OM practices (Smith and Lewis, 2011) aligned with seemingly incompatible organizational culture types. For example, a hierarchy organizational culture type (based on control and stability) supports the effectiveness of process improvement practices in enhancing efficiency (their targeted outcome) but not the effectiveness of innovation practices in achieving their targeted innovation outcome, which aligns with an adhocracy organizational culture type (characterized by flexibility and dynamism) (Cameron and Quinn, 2011; Prajogo and McDermott, 2011).

Strategic tensions raise important questions about the effectiveness of opposing OM practices in satisfying targeted outcomes and the influence of organizational culture. For example, can a firm be efficacious in implementing OM practices that target improving opposing outcomes but are aligned with opposing organizational culture types? What are the implications for OM practice effectiveness of the coexistence of opposing organizational culture types? Is the effectiveness of an OM practice maximized when a firm is characterized by only aligned organizational culture types? Is it compromised by the presence of opposing organizational culture types?

Research on organizational culture offers some answers based on two main perspectives. Many studies follow a contingency view, suggesting the need for aligning OM practices with specific organizational culture types (Gambi *et al.*, 2015; Valmohammadi and Roshanzamir, 2015; Yang *et al.*, 2017a). They suggest that misalignment due to a firm adopting practices opposed to its organizational culture profile sends employees contrasting messages and causes conflict (Khazanchi *et al.*, 2007), inefficient adaptation and superficial practice adoption (Lozeau *et al.*, 2002). Other studies embrace a paradox perspective, which posits that coexistence of opposing organizational culture types can support the effectiveness of some OM practices (Naor *et al.*, 2008; Hardcopf *et al.*, 2021) and that opposing practices can be synergistically integrated when supported by an organizational culture that values opposing organizational culture types (Pagell *et al.*, 2014). However, there are no definitive conclusions about OM practice effectiveness concerning whether firms should promote alignment with their organizational culture or embrace opposing elements. Our study contributes to this debate by addressing the following research question: *How does a firm's organizational culture profile influence the effectiveness of opposing OM practices in improving their targeted outcomes?*

We build on the competing values framework (CVF) (Quinn and Rohrbaugh, 1983; Cameron and Quinn, 2011) to differentiate between opposing elements that include organizational culture types, OM practices and outcomes. We develop alternative sets of hypotheses about OM practice effectiveness in firms with different organizational culture profiles, based on contingency theory and paradox theory. As discussed in the seminal paper by Smith and Lewis (2011), which contrasts these theories, although both attend to strategic tensions between opposing elements, they use alternative assumptions and prescriptions that promote congruence and selection vs coexistence of opposing elements. We test our hypotheses by analyzing data gathered from over 7,000 respondents from 330 manufacturing plants in 15 countries. We classify organizational culture profiles as dominant or eclectic, distinguishing between plants whose organizational culture has a prevalent organizational culture type and those whose organizational culture type contains similar levels of opposing organizational culture types.

This study makes several important contributions. It fills a gap in OM research on organizational culture by characterizing a plant's organizational culture as a profile of organizational culture types while simultaneously investigating the effectiveness of various OM practices in improving opposing outcomes. This approach is fundamental to studying the issue of tensions between opposing elements. This study also fills in a gap in the operations strategy literature on opposing elements (Skinner, 1969; Rosenzweig and Easton, 2010; Pagell *et al.*, 2014) by empirically comparing the contingency and paradox perspectives. Our results contribute to important discussions about future research, as well as provide further evidence on the importance of organizational culture profiles (Marinova *et al.*, 2019; Hardcopf *et al.*, 2021).

2. Theoretical background

Organizational culture is defined as the norms, behaviors, values and beliefs defining a firm's unique social and psychological environment (Detert *et al.*, 2000). It acts as the "social glue" that gives employees a sense of identity through stabilizing social systems and providing unwritten guidelines (Cameron and Quinn, 2011). Organizational culture encompasses a wide range of shared values, including beliefs about human relationships and teamwork, the extent to which control should be centralized and openness to change (Jung *et al.*, 2009). According to the integration and/or unitarist perspective, culture values are consistently interpreted within an organization, leading to an organization-wide consensus among its members, whereas the pluralist and/or differentiated view acknowledges the existence of diverse subcultures within organizations (Martin, 1992). This study adopts the unitarist perspective, which is widespread in the OM literature (Marshall *et al.*, 2016), as it better supports this study's aim of contrasting the need to select or synergistically integrate opposing cultural types within an organization's profile, addressing the ongoing debate about whether firms should promote alignment with their organizational culture or embrace opposing elements for greater OM practice effectiveness. We apply the CVF (Quinn and Rohrbaugh, 1983), which is a well-established and theoretically robust tool, for studying organizational culture that has been extensively applied in past OM research (Prajogo and McDermott, 2005, 2011; Naor *et al.*, 2008; Zu *et al.*, 2010; Gambi *et al.*, 2015; Hardcopf *et al.*, 2021; Lee *et al.*, 2021).

2.1 The CVF framework and organizational culture types

The CVF builds upon two sets of competing values based on strategic tensions. The vertical dimension emphasizes flexibility, discretion and dynamism vs stability, order and control, while the horizontal dimension emphasizes internal orientation, integration and unity vs external orientation, differentiation and rivalry (Cameron and Quinn, 2011). Each quadrant defined by these competing values is distinct from the others and has a spatial relationship with adjacent quadrants (Cameron and Quinn, 2011) (Table 1). For example, a hierarchy organizational culture type (Quadrant 3) shares characteristics related to stability, order and control with a market organizational culture type (Quadrant 4) and characteristics related to internal orientation, integration and unity with a clan organizational culture type (Quadrant 1). However, it shares no characteristics with an adhocracy organizational culture type (Quadrant 2), which we describe as its opposing organizational culture type because it is on the diagonal with hierarchy.

Table 1 summarizes characteristics of each quadrant, while Figure 1 emphasizes the tensions this research intends to address in the diagonals. A clan organizational culture type (Quadrant 1) values building human capital by engaging employees. It builds on the belief that ensuring employees share a common set of values, beliefs and goals is effective in coordinating firm actions, consistent with the human relations movement (McGregor, 1960). An adhocracy organizational culture type (Quadrant 2) values innovating and creating new knowledge (Cameron and Quinn, 2011), aligning well with uncertain and ambiguous external

Table 1. Competing values framework and associated constructs

	Diagonal 1 Quadrant 2	Quadrant 3	Diagonal 2 Quadrant 1	Quadrant 4
Focus	• Flexibility, discretion and dynamism • External focus, differentiation and rivalry	• Stability, order and control • Internal focus, integration and unity	• Flexibility, discretion and dynamism • Internal focus, integration and unity	• Stability, order and control • External focus, differentiation and rivalry
Tension	External flexibility vs internal stability		Internal flexibility vs external stability	
Goal	Innovating, creating new knowledge	Process stability, predictability	Engaging employees, creating human capital	Expanding by outpacing competition
Organizational culture type	Adhocracy	Hierarchy	Clan	Market
Aligned OM practice bundle	*Create* bundle • Continuous improvement • Environmental scanning • SC cooperation	*Control* bundle • Statistical process control • Setup time reduction • Preventive maintenance	*Collaborate* bundle • Employee selection • Training and development • Empowerment	*Compete* bundle • SC integration • Long-term SC relationships • Supplier development
Targeted outcomes	Innovation-related outcomes • # new products • ROI: innovation	Efficiency-related outcomes • Cost reduction • Consistent outputs	Employee-related outcomes • Retention rate • ROI: training	Customer-related outcomes • Product quality • Market share

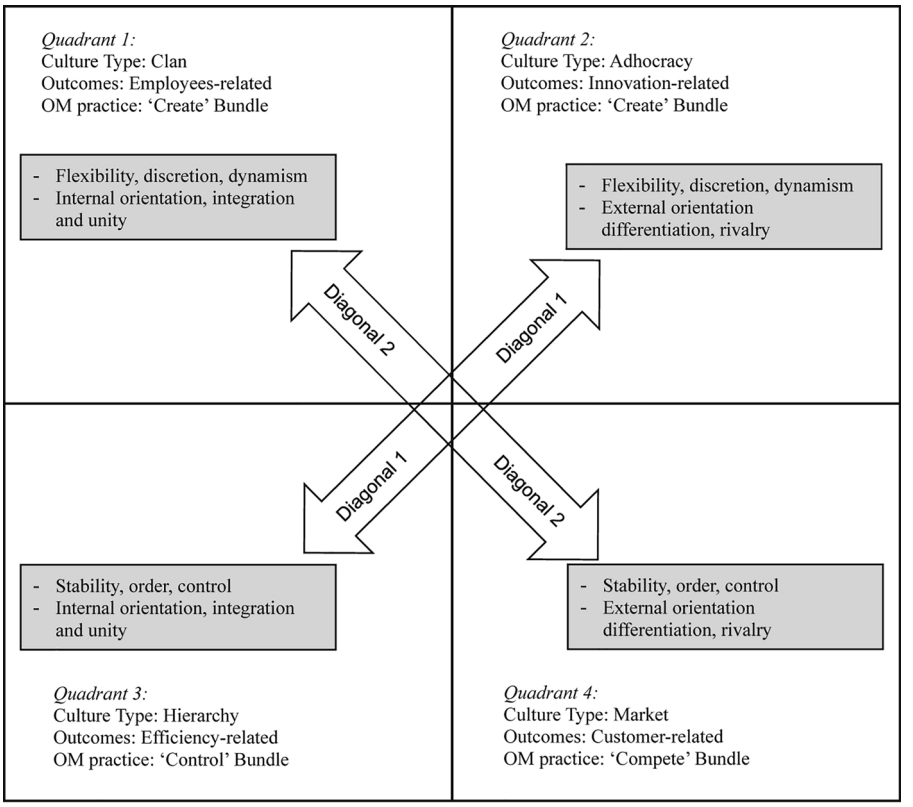
Source(s): Authors' own creation

environments. A hierarchy organizational culture type (Quadrant 3) values a structured work environment to enable employees to coordinate and guide their work (Cameron and Quinn, 2011). A market organizational culture type (Quadrant 4) values outpacing the competition and using competitive dynamics to guide employees (Cameron and Quinn, 2011).

2.2 Organizational culture types, OM practice bundles and outcomes

Characteristics of the organizational culture type associated with each quadrant are consistent with the bundles of OM practices and performance outcomes (Figure 1). We replicate the approach of past research (Cameron and Quinn, 2011) by using the focus of each quadrant (organizational culture type) to identify aligned OM practice bundles (Table 1). We rely on previous CVF studies on performance outcomes (Quinn and Kimberly, 1984; Hartnell *et al.*, 2011), which proposed a set of performance outcomes related to each quadrant. While a specific OM practice bundle can improve multiple outcomes (Bortolotti *et al.*, 2015b), understanding which bundles affect each outcome is beyond the scope of this study. Instead, we aim to understand which organizational culture profiles influence the effectiveness of OM practices in satisfying opposing outcomes. To this end, we simplify our baseline model by focusing on practice–outcome relationships within the same quadrant, reflecting the primary aim of the aligned OM practice bundle.

Because firms with a clan organizational culture type (Quadrant 1) value internal flexibility through attachment, belonging and trust (Cameron and Quinn, 2011), aligned OM practices relate to employee selection and training, employee and team development and empowerment



Source(s): Based on Cameron and Quinn (2011)

Figure 1. Strategic tensions and opposing elements based on the competing value framework

(Ahmad and Schroeder, 2003; Shah and Ward, 2003; Bortolotti *et al.*, 2015a). We refer to such practices as the *collaborate* bundle, synthesizing Cameron and Quinn's (2011) terminology with Shah and Ward's (2003) practice bundle construct. Consistent with prior OM research (Ahmad and Schroeder, 2003; Beraldin *et al.*, 2019), we expect employing *collaborate* bundle practices to promote employee empowerment, cohesiveness, commitment, work engagement and social well-being, which we call employee-related outcomes (Quinn and Kimberly, 1984).

Firms with an adhocracy organizational culture type (Quadrant 2) value developing a vision of the future through learning, creativity, risk-taking and adaptation to the external environment (Cameron and Quinn, 2011). Aligned OM practices focus on developing products and processes in anticipation of future needs, scanning the environment for opportunities and cooperating with SC members to absorb external knowledge to create innovative solutions (Mishra and Shah, 2009). We call such practices the *create* bundle (Cameron and Quinn, 2011), whose use supports innovation-related outcomes (Quinn and Kimberly, 1984).

Because firms with a hierarchy organizational culture type (Quadrant 3) value order, rules and regulations (Cameron and Quinn, 2011), aligned OM practices focus on maintaining control, reducing waste and lowering costs in internal operations through practices such as statistical process control, defect detection, efficient layout, setup time reduction and preventive maintenance (Shah and Ward, 2003; Ketokivi and Schroeder, 2004). We refer to

such practices as the *control* bundle (Cameron and Quinn, 2011). Their use leads to internal process stability, efficiency and consistent outputs (Ketokivi and Schroeder, 2004), which we call efficiency-related outcomes (Quinn and Kimberly, 1984).

Firms with a market organizational culture type (Quadrant 4) value achievement, customer satisfaction, competition and results (Cameron and Quinn, 2011). Aligned OM practices include SC integration, long-term relationships and supplier development, which seek to achieve SC control and satisfied customers (Min *et al.*, 2007). We call such practices the *compete* bundle (Cameron and Quinn, 2011). *Compete* bundle practices lead to a stable, effective supply network oriented toward delivering high-quality products, superior customer service and customer value (Vickery *et al.*, 2003; Min *et al.*, 2007), which we refer to as customer-related outcomes (Quinn and Kimberly, 1984; Hartnell *et al.*, 2011).

2.3 Effect of organizational culture profiles

Much of the OM literature on organizational culture focuses on pure organizational culture types and their relationship with practices. However, it is important to remember that clan, adhocracy, hierarchy and market are extremely used primarily for illustration (Cameron and Quinn, 2011), with most firms not characterized by a single organizational culture type. Rather, a firm is characterized by its mix of different levels of each type in a unique organizational culture profile (Denison and Spreitzer, 1991). For example, the profile of a technology-based start-up might include a high level of adhocracy, a moderate level of clan and lower levels of hierarchy and market. Thus, an organizational culture profile is a configuration of organizational culture types (Denison and Spreitzer, 1991; Marinova *et al.*, 2019).

The existing OM research on organizational culture offers a foundational understanding of tensions between opposing elements. While past research (e.g. Prajogo and McDermott, 2011) has explored tensions between opposing outcomes, its focus on individual culture dimensions has limited the understanding of how a firm's organizational culture profile supports its practices and performance (Cao *et al.*, 2015; Hartnell *et al.*, 2011). Several studies have examined the relationships between organizational culture dimensions and bundles of OM practices without considering outcomes (e.g. Cao *et al.*, 2015; Zu *et al.*, 2010). Additionally, most research uses aggregations of outcomes (e.g. Bortolotti *et al.*, 2015a, b; Wiengarten *et al.*, 2015) or multiple outcomes individually (e.g. Braunscheidel and Suresh, 2009; Braunscheidel *et al.*, 2010). Supplementary Appendix A provides more details on the classification of a representative sample of prior OM studies on organizational culture. Our research advances this foundation by examining the relationship between OM practice bundles and outcomes in firms with different organizational culture profiles.

Understanding the impact of organizational culture profiles is intriguing, since profiles can include opposing (on the diagonal) culture types, which the CVF describes as incompatible. This logic can be extended to OM practice bundles aligned with opposing organizational culture types. Investigating the effectiveness of multiple, sometimes opposing, OM practices in achieving targeted outcomes in firms with different organizational culture profiles is important to enrich the debate on strategic tensions.

Consistent with the aim of investigating opposing elements, this research focuses on organizational culture profiles as configurations of opposing culture types, opposing OM practice bundles and outcomes. This approach allows addressing related questions posed in the literature on contingencies (Sousa and Voss, 2008), trade-offs (Rosenzweig and Easton, 2010), ambidexterity (O'Reilly and Tushman, 2013) and paradoxes (Smith and Lewis, 2011). This long-standing debate can be described by two alternative schools of thought: the contingency perspective (selecting between opposing elements) vs the paradox perspective (synergies between opposing elements) (Smith and Lewis, 2011; Valmohammadi and Roshanzamir, 2015).

2.3.1 Contingency perspective. Contingency theory (Lawrence and Lorsch, 1967) prescribes choosing practices aligned with a firm's external environment in making

strategic choices directed at improving a targeted outcome (Rosenzweig and Easton, 2010). It has its roots in Skinner's (1969) work on trade-offs, which states that "a production system can be designed to do some things well, but always at the expense of other[s] (p. 138)." Over the years, this has inspired theories on the trade-off between competing priorities (Rosenzweig and Easton, 2010), as well as providing a foundation for comparative studies of OM practice effectiveness in different contexts (Sousa and Voss, 2008).

According to the contingency perspective, the presence of opposing elements indicates a misfit that would impair a firm's competitiveness. This perspective supports organizational culture profiles that emphasize adjacent quadrants in the CVF, minimizing strategic tensions by avoiding opposing (on the diagonal) organizational cultures. We extend this to include OM practice bundles opposed to the dominant organizational culture type in a firm's organizational culture profile. According to the contingency perspective, effective OM practice implementation depends on alignment with the dominant organizational culture type, which Cameron and Quinn (2011) describe through the lens of leadership.

> When the leadership strengths of the individual are congruent with the dominant organization culture, those leaders tend to be more successful, as are the units they manage. Congruence predicts success (Cameron and Quinn, 2011, p. 53).

Based on this perspective, using OM practices within a CVF quadrant precludes successfully using practices in the opposing quadrant.

2.3.2 Paradox perspective. The paradox perspective builds on synergies between opposing elements. It prescribes moving toward synthesis (Smith and Lewis, 2011) through complementarities between opposing elements (Lewis, 2000). Wide application of paradox theory can be found in management literature (Denison *et al.*, 1995). Extant OM studies apply the paradox perspective to cumulative capabilities, sustainability, global SCs and ambidexterity (O'Reilly and Tushman, 2013; Papachroni *et al.*, 2015). Because the paradox perspective involves opposing, mutually exclusive elements that are equally necessary and contradictory (Smith and Lewis, 2011), it focuses on the characteristics of CVF quadrants on the diagonal. It takes the position that no choice needs to be made between opposing organizational culture types, which Cameron and Quinn (2011) describe using the example of leadership:

> The highest performing leaders . . . are self-contradictory, behaviorally complex leaders in the sense that they can be simultaneously hard and soft, entrepreneurial and controlled (Cameron and Quinn, 2011, p. 54).

In applying the paradox perspective to OM practices, a firm develops and integrates different (potentially opposing) practices rather than only using those that best align with its primary organizational culture. For example, Toyota's "rigid specification is the very thing that makes . . . flexibility and creativity possible" (Spear and Bowen, p. 97).

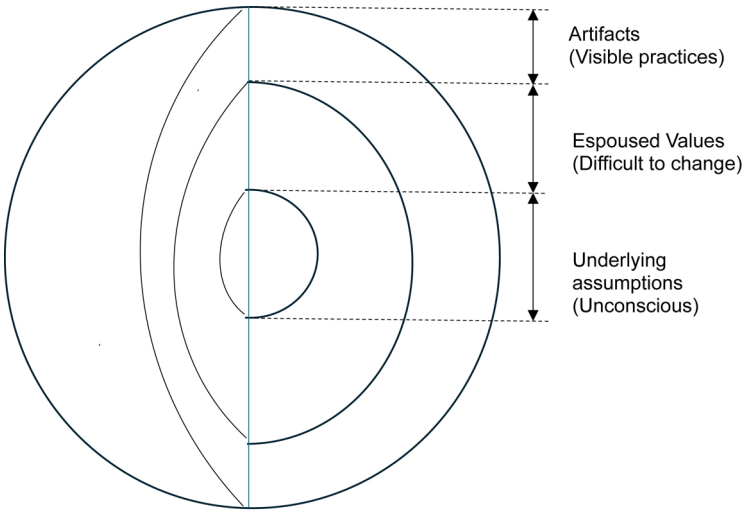
Thus, we consider how strategic tensions between opposing elements can be overcome in organizational culture profiles that simultaneously emphasize opposing organizational culture types to support OM practices such as Lean (Hardcopf *et al.*, 2021) or those targeting opposing outcomes, such as safety vs productivity (Pagell *et al.*, 2014). Building on Cameron and Quinn (2011), we distinguish between dominant organizational culture profiles (higher level of a single organizational culture type) and eclectic organizational culture profiles (opposing organizational culture types at a similar level). This distinction reflects the dichotomy between the contingency vs paradox perspectives.

3. Hypothesis development

Our research builds on the contingency and paradox perspectives to develop hypotheses predicting the effectiveness of OM practices in firms with dominant vs eclectic organizational culture profiles. We position organizational culture as a moderator due to its robustness to

change because it develops over a long period of time based on the firm's history, technology, products, management style, strategy, national culture and other factors (Schein, 2010). Schein (2010) describes organizational culture as existing in layers, where the deeper the layers of organizational culture, the more difficult they are to change (Figure 2). The most visible, accessible layer of organizational culture is comprised of artifacts (visible practices); artifacts like OM practice bundles are fairly easy to change. Below the artifact layer are the espoused values of an organizational culture, comprised of shared beliefs that people in a firm understand and can express, such as "error prevention is better than inspection" or "our customers are our top priority." At the deepest level of organizational culture are deeply embedded basic underlying assumptions, such as shared understanding of what is right vs wrong in various contexts. Underlying assumptions are unconscious and seem so self-evident that people in a firm are unable to articulate them. Although managers may be able to change elements of OM practice bundles or make the transition to different OM practice bundles, the most enduring parts of organizational culture exist at the level of underlying assumptions. Despite other changes that may take place in a firm and its competitive environment, a firm's organizational culture tends to be robust to change. In this paper, we view an organization's culture as a constant that moderates the relationship between OM practice bundles and performance. Compared to research that studies organizational culture as an antecedent to OM practice bundles, where culture is essentially assumed to cause practice adoption (Marshall *et al*., 2016), a moderation perspective acknowledges that there may be various non-cultural reasons for adopting specific OM practices (e.g. organization's strategy) while also recognizing that a certain cultural context can help or hinder organizations in coordinating OM efforts more effectively. This view is in line with more recent OM research on organizational culture (Bortolotti *et al*., 2015a, b; Wiengarten *et al*., 2015; Hardcopf *et al*., 2021).

In the next two sections, we elaborate support for the contingency and paradox views, focusing on strategic tensions inherent in the two diagonals of the CVF framework.



Source(s): Based on Schein (2010)

Figure 2. Layers of organizational culture

3.1 Dominant organizational culture profiles

The contingency perspective supports a dominant organizational culture profile, where a single organizational culture type is substantially stronger than the opposing culture type. It implies that OM bundle practices aligned with the stronger organizational culture type will be more effective, as consistency leads to a positive attitude and acceptance of practices by employees (Lozeau *et al.*, 2002). The contingency perspective suggests that OM practices in opposing quadrants are misaligned (Denison and Spreitzer, 1991) because the mixed messages about appropriate practices (Lewis, 2000; Khazanchi *et al.*, 2007) can cause anxiety that negatively affects outcomes (Smith and Lewis, 2011). Figure 3 highlights the effect of dominant organizational culture profiles on OM practice effectiveness, showing the appropriate OM practice bundle for each targeted outcome. In firms with an aligned dominant organizational culture profile, the relationship between OM practice bundles and outcomes is stronger, while it is weaker in firms with an opposing dominant culture profile.

Prior research supports the contention that a hierarchy-dominant organizational culture profile supports the effectiveness of *control* bundle practices (Kull and Wacker, 2010; Valmohammadi and Roshanzamir, 2015), because employees are motivated to use practices supporting stability, order and control. This gives them a negative predisposition toward *create* bundle practices, and thus, they refrain from discretionary behaviors, reducing creativity and avoiding experimentation (Büschgens *et al.*, 2013). In contrast, an adhocracy-dominant organizational culture profile supports practices embedded in the *create* practice bundle, which lead to better innovation-related outcomes; their focus on flexibility, discretion and dynamism causes employees to challenge assumptions and engage in experiments (Khazanchi *et al.*, 2007). For example, 3M's organizational culture values individual initiative and tolerates mistakes, supporting innovation-related outcomes through the development of new product opportunities (Canato *et al.*, 2013). Employees in firms with an adhocracy-dominant organizational culture profile avoid practices related to improving efficiency-related outcomes (*Control* bundle) (Grewal and Tansuhaj, 2001). For example, although Tesla's launch of innovative models caused production disruptions, product quality issues and extremely long delivery times, its focus has remained on developing innovative products rather than process improvement (Sherman, 2018; Sull and Sull, 2021). Thus, according to the contingency perspective, aligned OM practice bundles have a stronger impact on targeted outcomes in a plant with a supportive organizational culture profile. Conversely, OM practice bundles aligned with the opposing organizational culture profile will be less effective.

H1a. The effect of control bundle practices on efficiency-related outcomes is positively moderated by a hierarchy-dominant organizational culture profile.

H1b. The effect of control bundle practices on efficiency-related outcomes is negatively moderated by an adhocracy-dominant organizational culture profile.

H2a. The effect of create bundle practices on innovation-related outcomes is positively moderated by an adhocracy-dominant organizational culture profile.

H2b. The effect of create bundle practices on innovation-related outcomes is negatively moderated by a hierarchy-dominant organizational culture profile.

Similarly, a clan-dominant organizational culture profile supports the relationship between *collaborate* bundle practices and employee-related outcomes. Firms with a clan-dominant organizational culture profile value sharing new ideas, opportunities for change and flexibility (Rother, 2010). They favor *collaborate* bundle practices focused on employee learning and training. In contrast, the internal flexibility focus of a clan-dominant organizational culture can clash with *compete* bundle practices, such as SC integration and supplier development, which require an external orientation (Braunscheidel *et al.*, 2010; Rother, 2010). Such practices can be perceived as rigid and contrary to the flexible, trusting atmosphere that a clan-dominant culture cultivates.

Source(s): Authors' own creation

Figure 3. Moderating effect of dominant organizational culture profiles

A market-dominant organizational culture profile supports the relationship between *compete* bundle OM practices and customer-related outcomes. Employees are motivated to deliver superior value and embrace approaches that satisfy customer needs, such as SC integration (Braunscheidel and Suresh, 2009). However, the use of *collaborate* bundle practices by a firm with a market-dominant organizational culture profile can create mistrust because employees feel closely monitored (Hartnell *et al.*, 2011) and employees fear that production stops for training and learning activities could have negative sales consequences (Boscari *et al.*, 2016).

H3a. The effect of collaborate bundle practices on employee-related outcomes is positively moderated by a clan-dominant organizational culture profile.

H3b. The effect of collaborate bundle practices on employee-related outcomes is negatively moderated by a market-dominant organizational culture profile.

H4a. The effect of compete bundle practices on customer-related outcomes is positively moderated by a market-dominant organizational culture profile.

H4b. The effect of compete bundle practices on customer-related outcomes is negatively moderated by a clan-dominant organizational culture profile.

3.2 Eclectic organizational culture profiles

The paradox perspective is based on simultaneously embracing opposing elements (Denison and Spreitzer, 1991; Lewis and Smith, 2014). It suggests the effect of each OM practice bundle is supported by synergies between aligned and opposing organizational culture profiles (Smith and Lewis, 2011). Thus, the paradox perspective supports an eclectic organizational culture profile, which places similar value on opposing organizational culture types (Figure 4).

A hierarchy-adhocracy-eclectic organizational culture profile (Diagonal 1) enhances the effectiveness of *control* bundle practices because employees not only value standard processes (hierarchy), but they also realize process outcomes will decline over time if they are not open to new solutions (adhocracy). Similarly, a hierarchy-adhocracy-eclectic organizational culture profile supports employees' explorative behaviors (Yang *et al.*, 2017b), as they use standard processes as the foundation for applying their creativity (Spear and Bowen, 1999; Rother, 2010). For example, Toyota's orientation toward routine and standards (hierarchy) works synergically with values guiding employees' innovation efforts (adhocracy). The value of standardization permeates Toyota's new product development process (stable processes, formal reviews and milestones), reducing variation while preserving creativity in product design through rapid experimentation and direct observation (Lewis and Boyer, 2002). Synergies between Toyota's *control* and *create* bundles allow it to develop new vehicles faster, with stable, predictable outcomes (Morgan and Liker, 2006).

H5a. In a plant with a hierarchy-adhocracy-eclectic organizational culture profile, the effect of control bundle practices on efficiency-related outcomes is positively moderated by the coexistence of hierarchy and adhocracy organizational culture types.

H5b. In a plant with a hierarchy-adhocracy-eclectic organizational culture profile, the effect of create bundle practices on innovation-related outcomes is positively moderated by the coexistence of adhocracy and hierarchy organizational culture types.

Similarly, a clan-market eclectic organizational culture profile (Diagonal 2) increases the impact of both *compete* and *collaborate* bundle practices. Synthesizing values from market and clan organizational cultures nurtures open discussion and broadens employees' knowledge base, increasing their capacity to acquire and synthesize new knowledge (Cho and Linderman, 2019). In a clan-market eclectic organizational culture profile, the effectiveness of *compete* bundle practices, such as integration with suppliers and other SC

Source(s): Authors' own creation

Figure 4. Moderating effect of eclectic organizational culture profiles

partners, is enhanced because employees understand that involvement and openness to cooperating (clan) help achieve their firm's goals (market) (Foerstl *et al.*, 2021). Similarly, the impact of *collaborate* bundle practices is magnified by the value placed on employee initiative and development (clan) with customer-focused goals and objectives (market) that facilitate trusting employees to experiment (Khazanchi *et al.*, 2007). Idea exchange and open discussion (clan) are encouraged through rewards and incentives aligned with organizational goals (market) (Naor *et al.*, 2008).

H6a. In a plant with a clan-market eclectic organizational culture profile, the effect of collaborate bundle practices on employee-related outcomes is positively moderated by the coexistence of clan and market organizational culture types.

H6b. In a plant with a clan-market eclectic organizational culture profile, the effect of compete bundle practices on customer-related outcomes is positively moderated by the coexistence of market and clan organizational culture types.

4. Research method

4.1 Sampling and data collection

Hypotheses were tested using survey data from the high performance manufacturing (HPM) project (Round 4: 2013–2018), which contains data from 330 plants in 15 countries (Table 2), randomly selected from a master list in each country. It includes a mix of traditional and high-performing plants in the electronics, machinery and transportation industries, each with a minimum of 100 employees. There were 23 respondents targeted per plant, 2 in each of 11 functional areas plus the plant accountant. Each functional area's respondents received a dedicated questionnaire (Supplementary Appendix B). This design asked knowledgeable respondents to answer questions about their functional area and avoided artifactual covariance by collecting data on dependent and independent variables from different respondents. Using two respondents per functional area reduced the likelihood of common method bias (Podsakoff *et al.*, 2003). The interclass correlation (ICC) index for each item exceeds 0.70, indicating concordance among the respondents for each area (Hair *et al.*, 2010).

Table 2. Distribution of respondents

Country	# of plants Electronics	Machinery	Transportation	Total
Brazil	5	7	12	24
China	10	16	4	30
Spain	8	7	10	25
Finland	6	6	5	17
Germany	6	13	9	28
Israel	21	5	0	26
Italy	7	17	5	29
Japan	6	7	9	22
South Korea	8	5	13	26
Sweden	4	4	1	9
Taiwan	19	10	1	30
United Kingdom	4	5	4	13
United States	5	7	3	15
Vietnam	10	7	8	25
Switzerland	3	6	2	11
Total # of plants	*122*	*122*	*86*	*330*
Total # of respondents	*2,806*	*2,806*	*1,978*	*7,590*

Source(s): Authors' own creation

4.2 Measurement scales

We used a subset of HPM data comprised of reflective measures operationalized as five-point Likert scales (Supplementary Appendices C-E).

4.2.1 OM practice bundles. Consistent with prior research, we operationalized OM practice bundles as reflective second-order constructs to reduce potential confounding effects caused by correlation between variables that would normally be associated with complementary first-order factors (Mishra and Shah, 2009). To determine the practices comprising each bundle, we selected a set of practices aligned with each quadrant's orientation. We then followed an iterative procedure to identify the optimal configuration of practices for each quadrant to ensure both coherence with the CVF and robustness from a measurement validation perspective. Consequently, each OM practice bundle was measured by three or four complementary practice measures. The *control* practice bundle includes first-order measures of process control (Naor *et al.*, 2008), equipment layout (Ahmad and Schroeder, 2001), setup time reduction (Ketokivi and Schroeder, 2004) and preventive maintenance (McKone *et al.*, 2001). The *create* practice bundle includes first-order measures of the front-end new product development process (Khurana and Rosenthal, 1998), customer involvement in new product development (Cui and Wu, 2017) and design for quality (Zhang *et al.*, 2014). The *collaborate* practice bundle includes first-order measures of employee selection (Ahmad and Schroeder, 2003), employee training (Zhang *et al.*, 2012) and multifunction employees (Zhang *et al.*, 2012). The *compete* practice bundle includes first-order measures of SC quality focus (Schroeder *et al.*, 2002), formal supplier evaluation (Carr and Pearson, 1999) and shared meaning in the SC (Hult *et al.*, 2004).

4.2.2 Outcome measures. We built upon CVF research to develop four outcome measures, which we operationalized as reflective constructs. Quinn and Kimberly (1984) identified a set of performance outcomes related to each quadrant of the CVF: efficiency (Quadrant 1), innovation (Quadrant 2), employee satisfaction (Quadrant 3) and product quality and market share (Quadrant 4). In their meta-analytic investigation of the CVF literature, Hartnell *et al.* (2011) focused on quadrants 1, 3 and 4, describing the most adopted performance outcomes. They confirmed Quinn and Kimberly's (1984) innovation and employee-related outcomes and expanded product quality outcomes by adding customer service. Accordingly, we used the following performance outcomes. Efficiency-related outcomes (Quadrant 1) include unit cost of manufacturing and inventory turnover (McKone-Sweet and Lee, 2009), and innovation-related outcomes (Quadrant 2) include product launch timeliness and product innovativeness (Sanders-Jones and Linderman, 2014). Because employee-related outcomes (Quadrant 3) concern employees' collective attitude toward their organization (Hartnell *et al.*, 2011), we used a single item to assess employee relations with the organization. Single-item perceptual measures are acceptable when the construct is concrete and clear to the respondent (Bortolotti *et al.*, 2015a, b). However, this remains a limitation of this study, and future research should use a multi-item scale to measure employee-related outcomes. Customer-related outcomes (Quadrant 4) include product capability and performance, on-time delivery and customer support and service. Respondents were prompted to assess their plant's performance relative to their industry competitors to mitigate the influence of industry-related factors. We did not include financial performance because past studies have found that the impact of OM practices on financial performance is indirect (Vickery *et al.*, 2003) through customer service (Hartnell *et al.*, 2011), which we measured.

4.2.3 Organizational culture types. The measures of the organizational culture types were originally developed using an earlier round of HPM data by Naor *et al.* (2008) and subsequently refined by Cao *et al.* (2015). We operationalized dominance as the value of an organizational culture type minus the value of the opposing type:

(1) Hierarchy-dominant = $\text{Type}_H - \text{Type}_A$, if $\text{Type}_H > \text{Type}_A$, else 0;

(2) Adhocracy-dominant = $\text{Type}_A - \text{Type}_H$, if $\text{Type}_A > \text{Type}_H$, else 0;

(3) Clan-dominant = $Type_C - Type_M$, if $Type_C > Type_M$, else 0 and

(4) Market-dominant = $Type_M - Type_C$, if $Type_M > Type_C$, else 0.

"Else 0" was used to prevent negative values of dominance. Dominance of an organization culture type exists when the value of a culture type is higher than the opposing culture type. When the value of a culture type is lower than the opposing culture type, dominance shifts from the referenced culture type to the opposing one. This approach is commonly used when distinguishing a variable value above and below a target (Wiengarten *et al.*, 2019).

The organizational culture literature is unclear about whether an eclectic organizational culture profile involves the combined magnitude of opposing organizational culture types, their match or both (Marinova *et al.*, 2019). To address this, we built upon the ambidexterity literature (Cao *et al.*, 2009), which conceptualizes ambidexterity as the balance between exploration and exploitation and their simultaneous maximization, and thus, we measured an eclectic organizational culture profile as the combined magnitude of the opposing types. In the ambidexterity literature, the combined magnitude of exploration and exploitation is measured using various methods, including the product of exploration and exploitation (He and Wong, 2004) and their sum (Lubatkin *et al.*, 2006). Because combining measures into a single index can result in significant loss of explanatory power (Edwards, 1994), we followed the procedures recommended by Edwards (1994) and adopted by Lubatkin *et al.* (2006). For each performance outcome, we first ran an unconstrained regression equation treating the performance outcome as the dependent variable, with the opposing organizational culture types as separate independent variables. Then, we performed two constrained regressions combining opposing organizational culture types into a single index: one using multiplication and the other using summation. Our findings (Table 3) showed that for efficiency-, employee- and customer-related outcomes, the additive model retained more information compared to the multiplicative model, while for innovation-related outcomes the retained information was comparable. Thus, the additive model was superior, ensuring more accurate interpretation. Therefore, we operationalized an eclectic organizational culture profile as the sum of the effects of opposing organizational culture types:

(5) Hierarchy-adhocracy eclectic = $Type_H + Type_A$

(6) Clan-market eclectic = $Type_C + Type_M$

Because the balance between opposing organizational culture types was already captured through our dominance (inverse of balance) measures, the balance dimension of an eclectic organizational culture profile becomes redundant when simultaneously testing both dominant and eclectic (combined magnitude) profiles (see Models 4 in Tables 4 and 5).

4.2.4 Control measures. We included several standardized measures as controls that could potentially influence performance: sales value of production, labor productivity, employee turnover and firm size (log transformed number of employees per plant).

Table 3. Comparison of additive and multiplicative models for combining opposing organizational culture types in predicting performance outcomes

Performance outcomes	Unconstrained model	Additive model	Multiplicative model	Best constrained model
Efficiency-related	0.078	0.077	0.012	Additive
Innovation-related	0.015	0.011	0.010	–
Employee-related	0.331	0.161	0.048	Additive
Customer-related	0.324	0.189	0.033	Additive

Source(s): Authors' own creation

Table 4. Moderated regression for Diagonal 1 strategic tensions

Model	Efficiency-related outcomes 1	2	3	4	Innovation-related outcomes 1	2	3	4
Control variables								
Sales value of production	0.127*	0.123*	0.122*	0.122*	0.142*	0.148*	0.141*	0.148*
Labor productivity	−0.071	−0.075	−0.086	−0.086	−0.010	−0.008	−0.005	−0.005
Employee turnover	−0.040	−0.014	−0.005	0.001	−0.009	−0.017	−0.006	−0.012
Firm size (log)	0.091	0.090	0.086	0.085	−0.003	−0.023	−0.002	−0.043
Control bundle					−0.019	−0.023	−0.018	−0.058
Create bundle	0.072	0.082	0.054	0.065				
Collaborate bundle	0.143*	0.163*	0.117	0.131*	0.199**	0.215**	0.198**	0.214**
Compete bundle	0.044	0.061	0.051	0.059	0.181**	0.168**	0.178**	0.163**
Aligned OM practice bundle								
Control bundle	0.222**	0.265**	0.187**	0.227**				
Create bundle					0.179**	0.202**	0.181**	0.196**
Organizational culture profiles								
Hierarchy-dominant		0.036		0.184		−0.092		−0.108
Adhocracy-dominant		−0.135		−0.080		−0.097		−0.081
Hierarchy-Adhocracy eclectic			0.064	0.044			−0.002	0.024
Interaction terms								
Control × Hierarchy-dominant (H1a)		0.007		−0.004				
Control × Adhocracy-dominant (H1b)		0.019		0.013				
Control × Hierarchy-adhocracy Eclectic (H2)			0.096**	0.082*				
Create × Adhocracy-dominant (H1a)						0.138*		0.131*
Create × Hierarchy-dominant (H1b)						−0.023		−0.035
Create × Hierarchy-adhocracy Eclectic (H2)							0.035	0.024
R^2	0.182	0.199	0.210	0.215	0.178	0.201	0.180	0.204
R^2 change associated with the interaction term(s)		0.001	0.021	0.014		0.019	0.002	0.021
(F-statistics)		(0.04)	(7.23**)	(1.65)		(3.34*)	(0.79)	(2.49)

Note(s): $^{*}p < 0.05$, $^{**}p < 0.01$, $n = 284$ for efficiency-related outcomes, $n = 294$ for innovation-related outcomes
Source(s): Authors' own creation

4.3 Measurement validation

The absolute values of skewness (below 1.21) and kurtosis (below 2.56) (Hair *et al.*, 2010) indicated item normality. Following item standardization, we validated the measures as follows. First, we applied confirmatory factor analysis (CFA) of first-order constructs by assigning items to their corresponding first-order constructs, with the covariance among the constructs freed. The model's fit indices were satisfactory [$\chi^2 = 2075.16$, χ^2/d.f. = 1.54, root mean square error of approximation (RMSEA) = 0.038, comparative fit index (CFI) = 0.954]. All items had statistically significant loadings, with composite reliability values between 0.71 and 0.91 and Cronbach's alpha values between 0.68 and 0.90, indicating internal consistency.

Table 5. Moderated regression for Diagonal 2 strategic tensions

Model	Employee-related outcomes 1	2	3	4	Customer-related outcomes 1	2	3	4
Control variables								
Sales value of production	−0.011	−0.026	−0.003	−0.018	0.150*	0.122*	0.154**	0.106*
Labor productivity	−0.085	−0.093	−0.085	−0.093	−0.028	−0.011	−0.051	−0.007
Employee turnover	−0.112*	−0.129*	−0.121*	−0.132*	0.042	0.016	0.047	−0.009
Firm size (log)	−0.107	−0.093	−0.125*	−0.103	−0.173*	−0.074	−0.071	−0.047
Control bundle	0.219**	0.278**	0.115	0.116	0.018	0.025	−0.053	−0.065
Create bundle	0.040	0.042	0.064	0.037	0.213**	0.158**	0.192**	0.147**
Collaborate bundle					0.018	0.151**	0.049	0.138*
Compete bundle	0.078	0.042	0.002	0.007				
Aligned OM practice bundle								
Collaborate bundle	0.174**	0.163*	0.116	0.172*				
Compete bundle					0.217**	0.199**	0.167**	0.156**
Organizational culture profiles								
Clan-dominant		0.030		0.082		−0.277**		−0.214**
Market-dominant		−0.146*		−0.092		0.005		0.068
Clan-market eclectic			0.167**	0.152**			0.189**	0.151**
Interaction terms								
Collaborate × Clan-dominant (H1a)				−0.030				
Collaborate × Market-dominant (H1b)		−0.065		0.064				
Collaborate × Clan-market eclectic (H2)		0.081	0.043	0.027				
Compete × Market-dominant (H1a)						−0.108		−0.099
Compete × Clan-dominant (H1b)						−0.157**		−0.102*
Compete × Clan-market eclectic (H2)							0.088**	0.072*
R^2	0.164	0.203	0.207	0.232	0.206	0.276	0.249	0.317
R^2 change associated with the interaction term(s)		0.014	0.006	0.011		0.023	0.026	0.033
(F-statistics)		(2.50)	(2.01)	(1.29)		(4.44*)	(9.86**)	(4.47**)

Note(s): $^{*}p < 0.05$, $^{**}p < 0.01$, $n = 295$ for employee-related outcomes and $n = 292$ for customer-related outcomes

Source(s): Authors' own creation

Analysis of standardized residuals did not reveal large correlations between error terms, with most standardized residuals lower than 2.58 (Hair *et al.*, 2010). We analyzed modification indices and the completely standardized expected changes in the loading with other variables. No items exhibited changes greater than 0.3. The square root of the average variance extracted (AVE) for each construct was greater than its correlation with the other constructs (Hair *et al.*, 2010) (Supplementary Appendix F). Thus, our measurement analysis provides evidence of reliability and convergent and discriminant validity of the first-order constructs.

Second, we used CFA to validate the second-order constructs, testing a measurement model for each OM practice bundle. The relationship between first- and second-order constructs was significant for all practice bundles, with coefficients ranging from 0.61 to 0.92. All fit indices were satisfactory (*Control*: $\chi^2 = 118.35$, χ^2/d.f. = 1.93, RMSEA = 0.054 and CFI = 0.968; *Create*: $\chi^2 = 46.38$, χ^2/d.f. = 1.45, RMSEA = 0.038 and CFI = 0.979; *Collaborate*: $\chi^2 = 31.70$, χ^2/d.f. = 1.32, RMSEA = 0.032 and CFI = 0.981; *Compete*: $\chi^2 = 49.83$,

χ^2/d.f. = 1.53, RMSEA = 0.042 and CFI = 0.976). The χ^2 differences between the constrained and unconstrained models for each pair of second-order constructs were all statistically significant, indicating discriminant validity. We then transformed the second-order factors into first-order factors by parceling items related to each OM practice. The final CFA validated the reduced measurement model (Supplementary Appendix G), with satisfactory fit indices (χ^2 = 86.50, χ^2/d.f. = 1.47, RMSEA = 0.038 and CFI = 0.979). All items had statistically significant loadings, with composite reliability values between 0.73 and 0.84 and Cronbach's alpha values between 0.72 and 0.84. The square root of each construct's AVE was greater than its correlation with the other constructs (Hair *et al.*, 2010). To further validate the final CFA measurement model, we randomly split the sample into two equal subsamples and conducted CFA, with results comparable to the CFA analysis for the full sample (Supplementary Appendix G).

Following measurement validation, we computed scores by averaging the values for each bundle's practices and for the items in the outcome measures and the organizational culture measures. We then computed the organizational culture profile variables as described above. Finally, we standardized all the variables as a measure to prevent high variance inflation factors (VIFs).

5. Analysis and results

We used moderated regression analysis to test the hypotheses for each outcome. High correlation between independent variables and moderators can lead to problems related to multicollinearity; the correlations between our independent and moderating variables were low, with the highest being 0.33. Tables 4 and 5 show the estimated ordinary least squares (OLS) parameters for the two CVF diagonals. Each provides results for four models to facilitate evaluation of the comparative explanatory contribution of each set of variables, including the significance of R^2 changes associated with introduction of the interaction terms pertaining to our hypotheses. Model 1 (baseline model) tests the relationship between each OM practice bundle and its targeted outcome. It also includes the control variables, including controls for the effect of the other three OM practice bundles to reduce potential endogeneity due to omitted variables. The complete endogeneity assessment, including a two-stage least squares regression analysis with instrumental variables, is detailed in Supplementary Appendixes H and I. Model 2 added the terms for the dominant organizational culture profile aligned with the OM practice bundle and the opposing dominant profile and the interaction terms between each dominant organizational culture profile and its aligned and opposing OM practice bundles. Model 3 added the terms for the eclectic organizational culture profile and its interaction with the OM practice bundle aligned with the outcome. Model 4 is the complete model, which was used to simultaneously test our hypotheses. By including both the combined magnitude effects (the eclectic terms) and the balance effects (inverse of the dominant terms), Model 4 provides a robust test of the impact of an eclectic organizational culture profile, conceptualized as combined effects, while controlling for the balance effect. This approach was designed to contribute to the debate on the lack of clarity in the organizational culture literature (Marinova *et al.*, 2019) regarding whether an Eclectic organizational culture profile involves the combined magnitude of opposing culture types, their balance or both.

5.1 Effect of OM practice bundles on their targeted outcomes

Model 1 in Tables 4 and 5 indicates a significant positive effect between each OM practice bundle and its targeted outcomes: *control* bundle: efficiency-related outcomes (β = 0.222, $p < 0.01$), *create* bundle: innovation-related outcomes (β = 0.179, $p < 0.01$), *collaborate* bundle: employee-related outcomes (β = 0.174, $p < 0.01$) and *compete* bundle: customer-related outcomes (β = 0.217, $p < 0.01$). This verifies the baseline practice–outcome relationships described in Section 2.2.

5.2 Moderating effect of organizational culture

Table 4 reports results for the moderating effects for Diagonal 1 strategic tensions. The interaction terms in Model 4 indicate the effectiveness of *control* bundle practices on efficiency-related outcomes was not stronger in plants with a hierarchy-dominant organizational culture profile ($\beta = -0.004$ n.s., H1a not supported). However, the effectiveness of *create* bundle practices on innovation-related outcomes was stronger in plants with an adhocracy-dominant organizational culture profile ($\beta = 0.131$ $p < 0.05$, H2a supported).

H1b and H2b were not supported; there were no significant moderating effects of opposing organizational culture profiles (adhocracy-dominant on *control*-efficiency: $\beta = 0.013$ n.s., hierarchy-dominant on *create*-innovation: $\beta = -0.035$ n.s.). The relationship between *control* bundle practices and efficiency-related outcomes was significantly stronger in plants with a hierarchy-adhocracy-eclectic organizational culture profile ($\beta = 0.082$, $p < 0.05$), supporting H5a. However, a hierarchy-adhocracy-eclectic organizational culture profile did not significantly moderate the relationship between *create* bundle practices and innovation-related outcomes ($\beta = 0.024$ n.s., H5b not supported).

Table 5 contains the results of the moderation analysis for Diagonal 2 strategic tensions. The interaction terms reported in Model 4 indicate the relationship between *collaborate* bundle practices and employee-related outcomes was not stronger in firms with a clan-dominant organizational culture profile ($\beta = -0.030$ n.s., H3a not supported) and the relationship between *compete* bundle practices and customer-related outcomes was not stronger in firms with a market-dominant organizational culture profile ($\beta = -0.099$ n.s., H4a not supported). In terms of opposing organizational culture profiles, *collaborate* bundle practices were not less strongly related to employee-related outcomes in firms with a market-dominant organizational culture ($\beta = 0.064$ n.s., H3b not supported). However, *compete* bundle practices were less strongly related to employee-related outcomes in plants with a clan-dominant organizational culture profile ($\beta = -0.102$ $p < 0.05$, H4b supported). There was not a significant moderating effect of a clan-market eclectic organizational culture profile on the relationship between *collaborate* bundle practices and employee-related outcomes ($\beta = 0.027$ n.s., H6a not supported). Finally, the relationship between *compete* bundle practices and customer-related outcomes was stronger in plants with a clan-market-eclectic organizational culture ($\beta = 0.072$ $p < 0.05$), supporting H6b.

5.3 Additional analysis

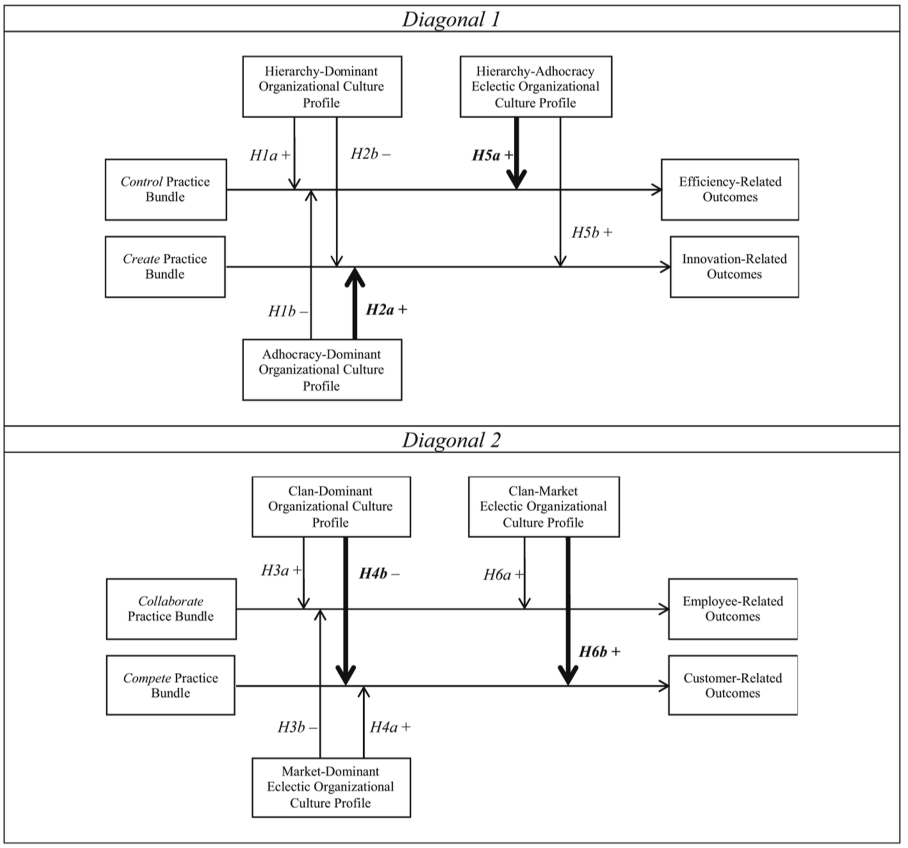
Tables 4 and 5 reveal significant non-hypothesized results for some practice bundles included as control variables: in Table 4, *collaborate* practice bundle with efficiency-related outcomes ($\beta = 0.143$; $p < 0.05$) and innovation-related outcomes ($\beta = 0.199$; $p < 0.01$) and *compete* practice bundle with innovation-related outcomes ($\beta = 0.181$; $p < 0.01$). In Table 5, *control* bundle practices were significantly associated with employee-related outcomes ($\beta = 0.219$; $p < 0.01$), while *create* bundle practices were associated with customer-related outcomes ($\beta = 0.213$; $p < 0.01$). To provide a deeper understanding of opposing elements, our *post hoc* analysis explored how outcomes were directly related to OM practice bundles in other quadrants or indirectly related through improvements in outcomes in other quadrants due to related OM practice bundles, as suggested by the literature on cumulative capabilities (Ferdows and De Meyer, 1990). We build on Zhao *et al*. (2010), which described why the requirement of a significant relationship between independent and dependent variables in Baron and Kenny's (1986) method is superfluous. We ran a mediation analysis to test all possible paths between OM practice bundles and non-target performance outcomes rather than only focusing on the paths with a significant practice–performance relationship. We ran two cluster analyses to search for firms with different organizational culture profiles and then applied mediation analysis within each cluster. We used PROCESS (Hayes, 2013) with 95% bias-corrected confidence intervals and 10,000 bootstrapping subsamples. The results

(Supplementary Appendix J) support the findings of our original analysis, providing evidence of the robustness of our main conclusions when applying a different methodology for creating organizational culture profiles and for data analysis. Although non-hypothesized, these results provide additional evidence about how firms improve opposing outcomes using multiple OM practices.

6. Discussion

6.1 Summary of key findings

Our results demonstrate that the impact of three OM practice bundles on targeted outcomes is positively moderated by a specific organizational culture profile (Figure 5). We found significant positive moderating effects of organizational culture profiles for the link between *create* practices and innovation-related outcomes (H2a), *control* practices and efficiency-related outcomes (H5a) and *compete* practices and customer-related outcomes (H6b). For *compete* practices, we also found that the effect of OM practice bundles on targeted outcomes is negatively moderated by the opposing dominant organizational culture profile (H4b). There



Note(s): Significant moderations are in bold. Left refers to Dominant- and right to Eclectic-organizational culture profiles (relationships are tested separately)

Source(s): Authors' own creation

Figure 5. Graphical summary of the key results

was not a significant moderating effect for the link between *collaborate* practices and employee-related outcomes, which indicates that *collaborate* practices may operate regardless of cultural contexts. In contrast, other OM bundles are more effective in specific cultural contexts. Whether a dominant or eclectic organizational culture profile is important depends on the OM practice bundle. Overall, this research concludes it is not possible to state that either the contingency or paradox perspective is universally preferable, as our findings provide evidence on the validity of each perspective based on the strategic tensions and OM practice bundles considered.

6.2 Theoretical implications and future research

6.2.1 Configurational approach to studying organizational culture. Our findings support the need for a configurational (profile) approach to studying organizational culture and the contention that focusing on individual organizational culture types can be misleading. This is in line with the recent shift in OM toward analyzing organizational culture profiles (Valmohammadi and Roshanzamir, 2015; Hardcopf *et al.*, 2021). The overall results for Diagonal 1 strategic tensions highlight the importance of operationalizing organizational culture as a configuration of opposing culture types, advancing arguments on how adhocracy and hierarchy organizational culture types influence the effectiveness of OM practice bundles (Grewal and Tansuhaj, 2001; Khazanchi *et al.*, 2007; Kull and Wacker, 2010). For instance, the *control* bundle is more effective in plants with strong opposing cultures in an eclectic organizational culture profile (H5a supported, H1b not supported), while the *create* bundle is more effective in plants where the opposing culture is weak in a dominant organizational culture profile (H2a supported, H5b not supported).

Similarly, our results for Diagonal 2 support Cao *et al.*'s (2015) contention that the organizational culture profile driving SC integration (*compete*) must be high in both clan and market (H6b supported). In addition, the negative moderation by the clan-dominant organizational culture profile on the effectiveness of *compete* practices suggests that, when clan values are associated with weak market values, practices can be "corrupted" due to superficial practice adoption by a culture-practice misfit (Lozeau *et al.*, 2002) (H4b supported); when these practices are adopted in a clan-dominant organizational culture, their effect is reduced.

6.2.2 Implications of contingency and paradox perspectives. The results of this study enrich the debate on strategic tensions (Khazanchi *et al.*, 2007; Hardcopf *et al.*, 2021) by testing when a *contingency* vs *paradox* perspective is supported by the relationship between OM practice bundles and performance in firms with dominant vs eclectic organizational culture profiles. Previous literature has viewed them as alternative perspectives and discussed their validity by juxtaposing them at a theoretical level (Smith and Lewis, 2011). Our results reinforce the simultaneous existence of both perspectives when looking at OM practice effectiveness and organizational culture. On Diagonal 1, we show that coexistence of hierarchy and adhocracy values fosters effectiveness of the *control* bundle, consistent with the paradox perspective. Conversely, the contingency perspective better describes the *create* bundle, whose effect on innovation-related outcomes is stronger in plants with an adhocracy-dominant organizational culture profile. On Diagonal 2, a clan-market eclectic organizational culture profile fosters effectiveness of *compete* bundle practices, supporting the paradox perspective. However, the effectiveness of the same practices is hindered in a clan-dominant culture, supporting the contingency perspective. Thus, our results show that it is not possible to assert whether the contingency or paradox perspective prevails when examining the strategic tensions in the CVF diagonals.

This study sheds light on the dynamics underlying the effectiveness of OM practice in organizations with a dominant or eclectic culture, leading to a better understanding of the precise implications of contingency and paradox perspectives for achieving opposing outcomes. The comparison of Diagonals 1 and 2 reveals differing dynamics. While the

paradox perspective is confirmed for both diagonals through leveraging synergies between opposing elements, the contingency perspective entails different dynamics for each. In Diagonal 2, the contingency perspective manifests in the negative effects of misalignment between the *compete* practice bundle and an opposing clan-dominant organizational culture profile, such as mixed messages, anxiety and defensive behavior among employees. In Diagonal 1, the contingency perspective emphasizes congruence and alignment, demonstrating that the *create* practice bundle is more effective when aligned with an adhocracy dominant organizational culture profile. However, this profile does not hinder the effectiveness of opposing practices (*control* practice bundle). Therefore, we advance that following a contingency perspective does not necessarily compromise the successful implementation of unaligned practices. As the 3M example demonstrates, in presence of low organizational cultural fit, *control* practices can be "coercively" implemented with a positive effect on efficiency (Canato *et al.*, 2013).

Additionally, looking at Diagonal 1, these dynamics imply that an organization with a hierarchy-adhocracy-eclectic organizational culture profile excel in both innovation- and efficiency-related outcomes. An adhocracy-dominant organization can also exploit the positive moderation effect of its culture profile on the relationship between *create* practices and innovation-related outcomes without hindering the effectiveness of *control* practices. Instead, in Diagonal 2, an eclectic firm will excel in both employee- and customer-related outcomes compared to other firms, as it can exploit the positive moderating effect of the coexistence of opposing culture types, while avoiding the negative effects due to the dominance of a culture type. These results highlight the importance of deepening into specific tensions when deriving theoretical (Section 6.2.3) and managerial implications (Section 6.3). Future research may extend the analysis of tensions and test of contingency and paradox views to other OM practices, spanning the four bundles and beyond (e.g. sustainability management and Industry 4.0 techniques).

6.2.3 Ambidexterity: achieving excellence in both innovation and efficiency. Our study contributes to the internal control vs external flexibility debate in the ambidexterity literature (Papachroni *et al.*, 2015), with unexpected results. It found that, while firms with a hierarchy-adhocracy-eclectic organizational culture profile can maximize effectiveness of *control* bundle practices (exploitation), they did not excel in innovation through *create* (exploration) practices, as firms with an adhocracy-dominant organizational culture profile do. We argue that, while *control* bundle practices benefit from the coexistence of values promoting control, stability and innovation, *create* bundle practices instead benefit from an organizational culture profile oriented toward creativity, risk-taking and adaptation (adhocracy-dominant). Thus, as organizational culture profiles maximizing exploitation and exploration effectiveness differ, the debate shifts from focusing on exploration vs exploitation as competing approaches to finding improvement paths that align with a firm's organizational culture profile, achieving excellence in both areas. By incorporating organizational culture profiles into the debate on exploitation vs exploration, we provide a novel interpretation of why firms sometimes struggle to be ambidextrous, and we suggest ways to achieve excellence in both innovation and efficiency in firms with different organizational culture profiles.

Together, these results make a substantial contribution not only to the OM literature on organizational culture but also to theories on opposing elements and the ambidexterity literature (Papachroni *et al.*, 2015). This conclusion is based on a unitarist view of organizational culture, while future research adopting a pluralist view (Martin, 1992) can complement it by investigating effectiveness of exploration and exploration when implemented by organizational units characterized by different subcultures (adhocracy-dominant and hierarchy-adhocracy-eclectic organizational culture profile, respectively).

6.2.4 Further research on alternative explanations. The non-significant results for some moderation effects, together with our additional analysis, open interesting new lines for future research on further explanations for the influence of organizational culture profiles on OM practice effectiveness, beyond the contingency and paradox perspectives. Our results reveal

there may be multiple dynamics through which OM practices impact outcomes in various organizational culture profiles, warranting further research.

First, we propose a novel, positive interpretation of practice corruption. Our research design models misalignment as a negative moderation of organizational culture (H1b, H2b, H3b and H4b) and interprets the resulting dynamics as "corruption" due to superficial practice adoption (Lozeau *et al*., 2002), as in case of *compete* practice bundle (H4b) (Figure 4). However, H1b, H2b and H3b were not supported. Based on our additional analysis and consistent with related literature (Lozeau *et al*., 2002; Marshall *et al*., 2016), we suggest an additional interpretation of practice corruption. In firms with a hierarchy-adhocracy-eclectic organizational culture profile, *collaborate* and *compete* practice bundles have a positive direct impact on innovation-related outcomes. This may be due to the intrinsically more general nature of the practices in the *collaborate* and *compete* bundles, or it may indicate that these practices can be transformed and reinterpreted as they are implemented (Lozeau *et al*., 2002) to make them more compatible with the organizational culture context. We see this as a benefit of practice corruption. Thus, the misalignment construct provides a foundation for potentially interesting research directions.

Second, we propose a new line for future research in theories of cumulative capabilities (Ferdows and De Meyer, 1990). We found that, in some cases, the paradox perspective was not supported, as the eclectic organizational culture profile did not significantly positively moderate the effectiveness of the *create* and *collaborate* practice bundles (H5b and H6a). However, the additional analysis suggests an alternative interpretation in accordance with theories of cumulative capabilities (Ferdows and De Meyer, 1990), yet consistent with paradox theory (Denison *et al*., 1995; Cameron and Quinn, 2011). We found that eclectic organizational culture profile firms can use a wider repertoire of OM practices to improve opposing outcomes. For example, hierarchy-adhocracy-eclectic organizational culture profile firms can not only improve efficiency-related outcomes through *control* bundle practices (H5a) but also indirectly through improvements in other outcomes due to *collaborate* and *compete* bundles; they can also indirectly improve innovation-related outcomes through *collaborate*, *compete* and *control* bundle practices. Compared to dominant organizational culture profile firms, they can leverage a wider repertoire of abilities to excel in opposing innovation and efficiency outcomes. A similar conclusion can be advanced for clan-market-eclectic organizational culture profile firms which, compared to firms with a dominant organizational culture profile, can indirectly improve employee-related outcomes and customer-related outcomes through various OM practices. Further research and more conclusive evidence are required to deepen this view.

6.3 Managerial implications

The first step for managers in applying our findings is to recognize that firms have their own unique organizational culture profile that affects the effectiveness of practices. Understanding the basics of clan, adhocracy, hierarchy and market culture types will help managers clarify how their firm's organizational culture interacts with practice implementation and outcomes. It also lays the foundation for managers to consider their firm's profile of the four culture types and how it aligns with the relationship between their OM practice bundles and outcomes. Rather than trying to change their firm's organizational culture, which is robust and very difficult to change, managers should focus on understanding this as it is and strive to align it with appropriate OM practice bundles to achieve targeted outcomes.

When seeking competitive advantage in Diagonal 1 strategic tensions, managers in firms with a hierarchy-adhocracy-eclectic organizational culture profile should develop *control* bundle practices to maximize efficiency while also nurturing *create* bundle practices to address needs such as developing new products faster with stable and predictable outcomes (Morgan and Liker, 2006). Yet, the effect of *create* bundle practices on innovation is lower than in firms with an adhocracy-dominant organizational culture profile, and thus, managers should

be aware of this *innovation effectiveness gap* and search for alternative ways to excel in innovation. Future research could investigate the ability of firms with a hierarchy-adhocracy-eclectic organizational culture to leverage a wider repertoire of capabilities, for example, on *compete*, *collaborate* and *control* bundle practices oriented toward directly or indirectly improving innovation outcomes (Ferdows and De Meyer, 1990; Lozeau *et al.*, 2002). Alternatively, there is an opportunity to develop separate organizational areas with an adhocracy-dominant subculture specifically dedicated to *create* practices. In contrast, firms with an adhocracy-dominant organizational culture profile may suffer from inefficiencies due to the lower effectiveness of *control* bundle practices in improving efficiency, creating an *efficiency effectiveness gap*. In this case, to achieve efficiency outcomes, managers can develop *control* bundle practices as a "replacement" solution (Peters and Waterman, 1982), compensating for the absence of values related to stability and control in their organizational culture profile.

Managers should be aware that Diagonal 2 improvements in both employee-related and customer-related outcomes through *collaborate* and *compete* bundle practices are not possible in firms with a clan-dominant organizational culture profile. Due to the internal focus of firms with a clan-dominant organizational culture profile, *compete* bundle practices are likely to be only superficially adopted. Only when clan values are supplemented by market values (eclectic organizational culture profile) will *compete* bundle practices become critical for outcome improvement (Kull and Wacker, 2010) in a context where employees value openness of internal and external communication (Yang *et al.*, 2017a). When seeking competitive advantage in both employee-related outcomes and customer-related outcomes, our research findings imply that, with similar development of *compete* and *collaborate* bundle practices, a firm with a clan-market-eclectic organizational culture profile will outperform a firm with a clan-dominant organizational culture profile. In fact, although the effectiveness of *collaborate* practices is similar for these firms, firms with an eclectic organizational culture profile also excel in *compete* bundle practice effectiveness. Further research could also seek conclusive evidence about whether managers of firms with a clan-market-eclectic organizational culture profile should leverage a wide repertoire of OM practices to indirectly improve employee-related outcomes and customer-related outcomes.

7. Conclusions and limitations

As with all research, there are some limitations to our study. Although we included managers from different functions and assessed the presence of a shared organizational culture by verifying the inter-rater agreement (Naor *et al.*, 2010; Marinova *et al.*, 2019), we urge future studies to also include employees. In this way, tests of consistency can identify possible differences between firm members' perceptions of organizational culture. Although we focused on the important strategic tensions described in the CVF, firms must deal with an increasing variety of strategic tensions (Smith and Lewis, 2011; Zhang *et al.*, 2021). Future studies should consider strategic tensions associated with other opposing outcomes (e.g. cost vs environmental performance) as well strategic tensions between other practice bundles, such as mass customization, supply network design, sustainability, information and communications technology. The generalizability of our findings could be limited by the research setting, since the HPM sampled plants in 3 industries in 15 countries. Although this design enhances generalizability within the sampling frame, other strategic tensions might be salient in different industries and countries. Future research based on different settings would help to further establish the validity of our findings.

This study focuses on culture at the organizational level. Future studies could investigate the possibility of spill-over effects related to whether spatial separation is supported by the presence of subcultures within a firm. For example, a plant with a hierarchy-adhocracy-eclectic organizational culture profile implementing an exploitation strategy might have an adhocracy-dominant sub-culture in a different unit dedicated to *create* practices. A further

limitation concerns the measurement of organizational culture. Measuring espoused values and beliefs with a survey is very challenging, since members of an organizational culture are unable to recognize them due to their deep embeddedness. Espoused values and underlying beliefs make organizational culture enduring, but it is difficult to observe.

We conclude that OM practice bundle effectiveness depends on organizational culture profiles, supporting past evidence that improvement paths are not one-size-fits-all (Sousa and Voss, 2008). Although the OM research on organizational culture has previously investigated questions related to organizational culture and OM practice effectiveness (Marshall *et al.*, 2016), important questions remain about strategic tensions between opposing elements that firms must address today. Our results advance this research by testing two views: the contingency perspective, promoting choice between opposing elements, and the paradox perspective, which capitalizes on potential synergies. We found it is not possible to conclude that either perspective is universally applicable to understanding the role of organizational culture profiles on OM practice bundle effectiveness, as the best choice depends on the strategic tensions and OM practice bundle considered. Our research provides evidence on the validity of each perspective in firms with different organizational culture profiles with important implications for research and practice.

References

Ahmad, S. and Schroeder, R.G. (2001), "The impact of electronic data interchanges on delivery performance", *Production and Operations Management*, Vol. 10 No. 1, pp. 16-30, doi: 10.1111/j.1937-5956.2001.tb00065.x.

Ahmad, S. and Schroeder, R.G. (2003), "The impact of human resource management practices on operational performance: recognizing country and industry differences", *Journal of Operations Management*, Vol. 21 No. 1, pp. 19-43, doi: 10.1016/s0272-6963(02)00056-6.

Baron, R.M. and Kenny, D.A. (1986), "The moderator–mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations", *Journal of Personality and Social Psychology*, Vol. 51 No. 6, pp. 1173-1182, doi: 10.1037/0022-3514.51.6.1173.

Beraldin, A.R., Danese, P. and Romano, P. (2019), "An investigation of the relationship between lean and well-being based on the job demands-resources model", *International Journal of Operations and Production Management*, Vol. 39 No. 12, pp. 1295-1322, doi: 10.1108/ijopm-05-2019-0377.

Bortolotti, T., Boscari, S. and Danese, P. (2015a), "Successful lean implementation: organizational culture and soft lean practices", *International Journal of Production Economics*, Vol. 160, pp. 182-201, doi: 10.1016/j.ijpe.2014.10.013.

Bortolotti, T., Danese, P., Flynn, B.B. and Romano, P. (2015b), "Leveraging fitness and lean bundles to build the cumulative performance sand cone model", *International Journal of Production Economics*, Vol. 162, pp. 227-241, doi: 10.1016/j.ijpe.2014.09.014.

Boscari, S., Danese, P. and Romano, P. (2016), "Implementation of lean production in multinational corporations: a case study of the transfer process from headquarters to subsidiaries", *International Journal of Production Economics*, Vol. 176, pp. 53-68, doi: 10.1016/j.ijpe.2016.03.013.

Braunscheidel, M.J. and Suresh, N.C. (2009), "The organizational antecedents of a firm's supply chain agility for risk mitigation and response", *Journal of Operations Management*, Vol. 27 No. 2, pp. 119-140, doi: 10.1016/j.jom.2008.09.006.

Braunscheidel, M.J., Suresh, N.C. and Boisnier, A.D. (2010), "Investigating the impact of organizational culture on supply chain integration", *Human Resource Management*, Vol. 49 No. 5, pp. 883-911, doi: 10.1002/hrm.20381.

Büschgens, T., Bausch, A. and Balkin, D.B. (2013), "Organizational culture and innovation: a meta-analytic review", *Journal of Product Innovation Management*, Vol. 30 No. 4, pp. 763-781, doi: 10.1111/jpim.12021.

Cameron, K.S. and Quinn, R.E. (2011), *Diagnosing and Changing Organizational Culture: Based on the Competing Values Framework*, 3rd ed., Jossey-Bass, San Francisco, CA.

Canato, A., Ravasi, D. and Phillips, N. (2013), "Coerced practice implementation in cases of low cultural fit: cultural change and practice adaptation during the implementation of Six Sigma at 3M", *Academy of Management Journal*, Vol. 56 No. 6, pp. 1724-1753, doi: 10.5465/amj.2011.0093.

Cao, Q., Gedajlovic, E. and Zhang, H. (2009), "Unpacking organizational ambidexterity: dimensions, contingencies, and synergistic effects", *Organization Science*, Vol. 20 No. 4, pp. 781-796, doi: 10.1287/orsc.1090.0426.

Cao, Z., Huo, B., Li, Y. and Zhao, X. (2015), "The impact of organizational culture on supply chain integration: a contingency and configuration approach", *Supply Chain Management: An International Journal*, Vol. 20 No. 1, pp. 24-41, doi: 10.1108/scm-11-2013-0426.

Carr, A.S. and Pearson, J.S. (1999), "Strategically managed buyer-seller relationships and performance outcomes", *Journal of Operations Management*, Vol. 17 No. 5, pp. 497-519, doi: 10.1016/s0272-6963(99)00007-8.

Cho, Y. and Linderman, K. (2019), "Metacognition-based process improvement practices", *International Journal of Production Economics*, Vol. 211, pp. 132-144, doi: 10.1016/j.ijpe.2019.01.030.

Cui, A.S. and Wu, F. (2017), "The impact of customer involvement on new product development: contingent and substitutive effects", *Journal of Product Innovation Management*, Vol. 34 No. 1, pp. 60-80, doi: 10.1111/jpim.12326.

Denison, D.R. and Spreitzer, G.M. (1991), "Organizational culture and organizational development: a competing values approach", *Organizational Change and Development*, Vol. 5 No. 1, pp. 1-21.

Denison, D.R., Hooijberg, R. and Quinn, R.E. (1995), "Paradox and performance: toward a theory of behavioral complexity in managerial leadership", *Firm Science*, Vol. 6 No. 5, pp. 524-540, doi: 10.1287/orsc.6.5.524.

Detert, J.R., Schroeder, R.G. and Mauriel, J.J. (2000), "A framework for linking culture and improvement initiatives in organizations", *Academy of Management Review*, Vol. 25 No. 4, pp. 850-863, doi: 10.5465/amr.2000.3707740.

Edwards, J.R. (1994), "The study of congruence in organizational behavior research: critique and a proposed alternative", *Organizational Behavior and Human Decision Processes*, Vol. 58 No. 1, pp. 51-100, doi: 10.1006/obhd.1994.1029.

Ferdows, K. and De Meyer, A. (1990), "Lasting improvements in manufacturing performance: in search of a new theory", *Journal of Operations Management*, Vol. 9 No. 2, pp. 168-184, doi: 10.1016/0272-6963(90)90094-t.

Foerstl, K., Kähkönen, A.K., Blome, C. and Goellner, M. (2021), "Supply market orientation: a dynamic capability of the purchasing and supply management function", *Supply Chain Management: An International Journal*, Vol. 26 No. 1, pp. 65-83, doi: 10.1108/scm-06-2019-0233.

Gambi, L.D.N., Boer, H., Gerolamo, M.C., Jørgensen, F. and Carpinetti, L.C.R. (2015), "The relationship between organizational culture and quality techniques, and its impact on operational performance", *International Journal of Operations and Production Management*, Vol. 35 No. 10, pp. 1460-1484, doi: 10.1108/ijopm-12-2013-0563.

Grewal, R. and Tansuhaj, P. (2001), "Building organizational capabilities for managing economic crisis: the role of market orientation and strategic flexibility", *Journal of Marketing*, Vol. 65 No. 2, pp. 67-80, doi: 10.1509/jmkg.65.2.67.18259.

Hair, Jr., J.F., Black, W.C., Babin, B.J. and Anderson, R.E. (2010), *Multivariate Data Analysis*, 7th ed., Prentice Hall, Upper Saddle River, NJ.

Hardcopf, R., Liu, G.J. and Shah, R. (2021), "Lean production and operational performance: the influence of organizational culture", *International Journal of Production Economics*, Vol. 235, 108060, doi: 10.1016/j.ijpe.2021.108060.

Hartnell, C.A., Ou, A.Y. and Kinicki, A. (2011), "Organizational culture and organizational effectiveness: a meta-analytic investigation of the competing values framework's theoretical suppositions", *Journal of Applied Psychology*, Vol. 96 No. 4, pp. 677-694, doi: 10.1037/a0021987.

Hayes, A.F. (2013), "Mediation, moderation, and conditional process analysis", in *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*, edn, Guilford Publications, New York, Vol. 1, p. 20.

He, Z.L. and Wong, P.K. (2004), "Exploration vs exploitation: an empirical test of the ambidexterity hypothesis", *Organization Science*, Vol. 15 No. 4, pp. 481-494, doi: 10.1287/orsc.1040.0078.

Hult, G.T., Ketchen, D.J. and Slater, S.F. (2004), "Information processing, knowledge development, and strategic supply chain performance", *Academy of Management Journal*, Vol. 47 No. 2, pp. 243-253, doi: 10.5465/20159575.

Jung, T., Scott, T., Davies, H., Bower, P., Whalley, D., McNally, R. and Mannion, R. (2009), "Instruments for exploring organizational culture: a review of the literature", *Public Administration Review*, Vol. 69 No. 6, pp. 1087-1096, doi: 10.1111/j.1540-6210.2009.02066.x.

Ketokivi, M. and Schroeder, R.G. (2004), "Strategic, structural contingency and institutional explanations in the adoption of innovative manufacturing practices", *Journal of Operations Management*, Vol. 22 No. 1, pp. 63-89, doi: 10.1016/j.jom.2003.12.002.

Khazanchi, S., Lewis, M.W. and Boyer, K.K. (2007), "Innovation-supportive culture: the impact of organizational values on process innovation", *Journal of Operations Management*, Vol. 25 No. 4, pp. 871-884, doi: 10.1016/j.jom.2006.08.003.

Khurana, A. and Rosenthal, S.R. (1998), "Towards holistic 'front ends' in new product development", *Journal of Product Innovation Management*, Vol. 15 No. 1, pp. 57-74, doi: 10.1016/s0737-6782(97)00066-0.

Kull, T.J. and Wacker, J.G. (2010), "Quality management effectiveness in Asia: the influence of culture", *Journal of Operations Management*, Vol. 28 No. 3, pp. 223-239, doi: 10.1016/j.jom.2009.11.003.

Lawrence, P.R. and Lorsch, J.W. (1967), *Organization and Environment*, Harvard University Press, Cambridge, MA.

Lee, J.Y., McFadden, K.L., Lee, M.K. and Gowen, C.R. III (2021), "US hospital culture profiles for better performance in patient safety, patient satisfaction, Six Sigma, and lean implementation", *International Journal of Production Economics*, Vol. 234, 108047, doi: 10.1016/j.ijpe.2021.108047.

Lewis, M.W. (2000), "Exploring paradox: toward a more comprehensive guide", *Academy of Management Journal*, Vol. 25 No. 4, pp. 760-776, doi: 10.5465/amr.2000.3707712.

Lewis, M.W. and Boyer, K.K. (2002), "Factors impacting AMT implementation: an integrative and controlled study", *Journal of Engineering and Technology Management*, Vol. 19 No. 2, pp. 111-130, doi: 10.1016/s0923-4748(02)00005-x.

Lewis, M.W. and Smith, W.K. (2014), "Paradox as a metatheoretical perspective: sharpening the focus and widening the scope", *Journal of Applied Behavioural Science*, Vol. 50 No. 2, pp. 127-149, doi: 10.1177/0021886314522322.

Lozeau, D., Langley, A. and Denis, J.L. (2002), "The corruption of managerial techniques by organizations", *Human Relations*, Vol. 55 No. 5, pp. 537-564, doi: 10.1177/0018726702055005427.

Lubatkin, M.H., Simsek, Z., Ling, Y. and Veiga, J.F. (2006), "Ambidexterity and performance in small- to medium-sized firms: the pivotal role of top management team behavioral integration", *Journal of Management*, Vol. 32 No. 5, pp. 646-672, doi: 10.1177/0149206306290712.

Marinova, S.V., Cao, X. and Park, H. (2019), "Constructive organizational values climate and organizational citizenship behaviors: a configurational view", *Journal of Management*, Vol. 45 No. 5, pp. 2045-2071, doi: 10.1177/0149206318755301.

Marshall, D., Metters, R. and Pagell, M. (2016), "Changing a leopard's spots: a new research direction for organizational culture in the operations management field", *Production and Operations Management*, Vol. 25 No. 9, pp. 1506-1512, doi: 10.1111/poms.12562.

Martin, J. (1992), *Cultures in Organizations: Three Perspectives*, Oxford University Press, New York, NY.

McGregor, D. (1960), *The Human Side of Enterprise*, McGraw-Hill, New York, NY.

McKone, K.E., Schroeder, R.G. and Cua, K.O. (2001), "The impact of total productive maintenance on manufacturing performance", *Journal of Operations Management*, Vol. 19 No. 1, pp. 39-58, doi: 10.1016/s0272-6963(00)00030-9.

McKone-Sweet, K. and Lee, Y.T. (2009), "Development an analysis of a supply chain strategy taxonomy", *Journal of Supply Chain Management*, Vol. 45 No. 3, pp. 3-24, doi: 10.1111/j.1745-493x.2009.03167.x.

Min, S., Mentzer, J.T. and Ladd, R.T. (2007), "A market orientation in supply chain management", *Journal of the Academy of Marketing Science*, Vol. 35 No. 4, pp. 507-522, doi: 10.1007/s11747-007-0020-x.

Mishra, A.A. and Shah, R. (2009), "In union lies strength: collaborative competence in new product development and its performance effects", *Journal of Operations Management*, Vol. 27 No. 4, pp. 324-338, doi: 10.1016/j.jom.2008.10.001.

Morgan, J. and Liker, J. (2006), *The Toyota Product Development System Integrating People, Process, and Technology*, Productivity Press, New York: NY.

Naor, M., Goldstein, S.M., Linderman, K.W. and Schroeder, R.G. (2008), "The role of culture as driver of quality management and performance: infrastructure vs core quality practices", *Decision Sciences*, Vol. 39 No. 4, pp. 671-702, doi: 10.1111/j.1540-5915.2008.00208.x.

Naor, M., Linderman, K. and Schroeder, R. (2010), "The globalization of operations in Eastern and Western countries: unpacking the relationship between national and organizational culture and its impact on manufacturing performance", *Journal of Operations Management*, Vol. 28 No. 3, pp. 194-205, doi: 10.1016/j.jom.2009.11.001.

O'Reilly, C.A. and Tushman, M.L. (2013), "Organizational ambidexterity: past, present, and future", *Academy of Management Perspectives*, Vol. 27 No. 4, pp. 324-338.

Pagell, M., Johnston, D., Veltri, A., Klassen, R. and Biehl, M. (2014), "Is safe production an oxymoron?", *Production and Operations Management*, Vol. 23 No. 7, pp. 1161-1175, doi: 10.1111/poms.12100.

Papachroni, A., Heracleous, L. and Paroutis, S. (2015), "Organizational ambidexterity through the lens of paradox theory: building a novel research agenda", *The Journal of Applied Behavioral Science*, Vol. 51 No. 1, pp. 71-93, doi: 10.1177/0021886314553101.

Peters, T.J. and Waterman, R.H. (1982), *In Search of Excellence*, Harper & Row, New York.

Podsakoff, P.M., MacKenzie, S.B., Lee, J.Y. and Podsakoff, N.P. (2003), "Common method bias in behavioral research: a critical review of the literature and recommended remedies", *Journal of Applied Psychology*, Vol. 88 No. 5, pp. 879-903, doi: 10.1037/0021-9010.88.5.879.

Prajogo, D.I. and McDermott, C.M. (2005), "The relationship between total quality management practices and organizational culture", *International Journal of Operations and Production Management*, Vol. 25 No. 11, pp. 1101-1122, doi: 10.1108/01443570510626916.

Prajogo, D.I. and McDermott, C.M. (2011), "The relationship between multidimensional organizational culture and performance", *International Journal of Operations and Production Management*, Vol. 31 No. 7, pp. 712-735, doi: 10.1108/01443571111144823.

Quinn, R.E. and Kimberly, J.R. (1984), "Paradox, planning, and perseverance: guidelines for managerial practice", in Kimberly, J.R. and Quinn, R.E. (Eds), *New Futures: The Challenge of Managing Corporate Transitions*, Dow Jones–Irwin, Homewood, IL, pp. 295-313.

Quinn, R.E. and Rohrbaugh, J. (1983), "A spatial model of effectiveness criteria: towards a competing values approach to organizational analysis", *Management Science*, Vol. 29 No. 3, pp. 363-377, doi: 10.1287/mnsc.29.3.363.

Rosenzweig, E.D. and Easton, G.S. (2010), "Tradeoffs in manufacturing? A meta-analysis and critique of the literature", *Production and Operations Management*, Vol. 19 No. 2, pp. 127-141, doi: 10.1111/j.1937-5956.2009.01072.x.

Rother, M. (2010), *Toyota Kata: Managing People for Continuous Improvement and Superior Results*, McGraw-Hill Professional, New York NY.

Sanders-Jones, L. and Linderman, K. (2014), "Process management, innovation and efficiency performance: the moderating effect of competitive intensity", *Business Process Management Journal*, Vol. 20 No. 2, pp. 335-358, doi: 10.1108/bpmj-03-2013-0026.

Schein, E. (2010), *Organisational Culture and Leadership*, 4th ed., Jossey-Bass, San Francisco.

Schroeder, R.G., Bates, K.A. and Junttila, M.A. (2002), "A resource-based view of manufacturing strategy and the relationship to manufacturing performance", *Strategic Management Journal*, Vol. 23 No. 2, pp. 105-117, doi: 10.1002/smj.213.

Shah, R. and Ward, P.T. (2003), "Lean manufacturing: context, practice bundles, and performance", *Journal of Operations Management*, Vol. 21 No. 2, pp. 129-149, doi: 10.1016/s0272-6963(02)00108-0.

Sherman, L. (2018), "Tesla survived manufacturing hell-now comes the hard part", *Forbes*, available at: https://www.forbes.com/sites/lensherman/2018/12/20/tesla-survived-manufacturing-hell-now-comes-the-hard-part/?sh=30b5db97fae2 (accessed 8 February 2024).

Skinner, W. (1969), "Manufacturing-missing link in corporate strategy", *Harvard Business Review*, Vol. 47 No. 3, pp. 136-145.

Smith, W.K. and Lewis, M.W. (2011), "Toward a theory of paradox: a dynamic equilibrium model of organizing", *Academy of Management Review*, Vol. 36 No. 2, pp. 381-403, doi: 10.5465/amr.2011.59330958.

Sousa, R. and Voss, C.A. (2008), "Contingency research in operations management practices", *Journal of Operations Management*, Vol. 26 No. 6, pp. 697-713, doi: 10.1016/j.jom.2008.06.001.

Spear, S. and Bowen, H.K. (1999), "Decoding the DNA of the Toyota production system", *Harvard Business Review*, Vol. 77, pp. 96-108.

Sull, D. and Sull, C. (2021), "Culture 500", *MIT Sloan Management Review*, available at: https://sloanreview.mit.edu/culture500/ (accessed 8 February 2024).

Valmohammadi, C. and Roshanzamir, S. (2015), "The guidelines of improvement: relations among organizational culture, TQM and performance", *International Journal of Production Economics*, Vol. 164, pp. 167-178, doi: 10.1016/j.ijpe.2014.12.028.

Vickery, S.K., Jayaram, J., Droge, C. and Calantone, R. (2003), "The effects of an integrative supply chain strategy on customer service and financial performance: an analysis of direct vs indirect relationships", *Journal of Operations Management*, Vol. 21 No. 5, pp. 523-539, doi: 10.1016/j.jom.2003.02.002.

Wiengarten, F., Gimenez, C., Fynes, B. and Ferdows, K. (2015), "Exploring the importance of cultural collectivism on the efficacy of lean practices", *International Journal of Operations and Production Management*, Vol. 35 No. 3, pp. 370-391, doi: 10.1108/ijopm-09-2012-0357.

Wiengarten, F., Fan, D., Pagell, M. and Lo, C.K. (2019), "Deviations from aspirational target levels and environmental and safety performance: implications for operations managers acting irresponsibly", *Journal of Operations Management*, Vol. 65 No. 6, pp. 490-516, doi: 10.1002/joom.1032.

Wu, Y., Cegielski, C.G., Hazen, B.T. and Hall, D.J. (2013), "Cloud computing in support of supply chain information system infrastructure: understanding when to go to the cloud", *Journal of Supply Chain Management*, Vol. 49 No. 3, pp. 25-41, doi: 10.1111/j.1745-493x.2012.03287.x.

Yang, Y.S., Kull, T.J., Nahm, A.Y. and Li, B. (2017a), "Attitudes toward supplier integration: the USA vs China", *International Journal of Operations and Production Management*, Vol. 37 No. 8, pp. 1094-1116, doi: 10.1108/ijopm-08-2015-0504.

Yang, Y., Lee, P. and Cheng, T. (2017b), "Leveraging selected operational improvement practices to achieve both efficiency and creativity: a multilevel study in frontline service operations", *International Journal of Production Economics*, Vol. 191, pp. 298-310, doi: 10.1016/j.ijpe.2017.06.023.

Zhang, D., Linderman, K. and Schroeder, R.G. (2012), "The moderating role of contextual factors on quality management practices", *Journal of Operations Management*, Vol. 30 Nos 1-2, pp. 12-23, doi: 10.1016/j.jom.2011.05.001.

Zhang, D., Linderman, K. and Schroeder, R.G. (2014), "Customizing quality management practices: a conceptual and measurement framework", *Decision Sciences*, Vol. 45 No. 1, pp. 81-114, doi: 10.1111/deci.12059.

Zhang, J., Yalcin, M.G. and Hales, D.N. (2021), "Elements of paradoxes in supply chain management literature: a systematic literature review", *International Journal of Production Economics*, Vol. 232, 107928, doi: 10.1016/j.ijpe.2020.107928.

Zhao, X., Lynch Jr, J.G. and Chen, Q. (2010), "Reconsidering Baron and Kenny: myths and truths about mediation analysis", *Journal of Consumer Research*, Vol. 37 No. 2, pp. 197-206, doi: 10.1086/651257.

Zu, X., Robbins, T.L. and Fredendall, L.D. (2010), "Mapping the critical links between organizational culture and TQM/Six Sigma practices", *International Journal of Production Economics*, Vol. 123 No. 1, pp. 86-106, doi: 10.1016/j.ijpe.2009.07.009.

Supplementary material
The supplementary material for this article can be found online.

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