**Appendix A**

**A Review of Current Views**

To understand the trajectory of competitive dynamics research over time with a particular focus on the role of managers, we employed a systematic review approach and retrieved a population of 530 articles (see the Appendix Figure for a visual summary). The review started with a set of keywords and divided them into two types: cluster keywords and subordinate keywords within each cluster. The cluster keywords include terms such as “competitive”, “response”, “CEO”, “upper echelons”, or “board.” These keywords were used to form clusters of different combinations such as “competitive + response + executive.” In total, we employed 58 unique keyword combinations and used each combination to search the topic fields (title, abstract) within the Web of Science and Scopus database, placing delimiters on the scope of the search to journals in the Business or Management fields. We generated a database containing 26,353 articles (inclusive of duplicates).

 We then utilized the subordinate keywords to perform a search within each cluster to weed out irrelevant articles and narrow down the population. After employing these restrictions, we found 354 unique articles from both of the two databases after removing duplicates across clusters. For these 354 articles, we examined the most cited articles to perform a backward and forward citation search, which allowed us to locate an additional 29 articles from the backward citation search and 159 articles from the forward search. After removing 12 duplicates from the three populations, we located a total of 530 articles. These articles were then coded for content.

 As recognized in the main article, our review revealed that managers have long been thought to be a key driver of competitive action. As Chen and Miller (2012) note: “Underlying organizational forces are believed to explain and predict firm behaviors or (re)actions in the marketplace. Among these forces, leadership and human agency are held to be central to strategy and competition” (Chen and Miller, 2012: 138). But the role of managers, from a theoretical perspective, has not been entirely clear-cut. From our review, we deduced four unique conceptions: managers as equivalent to the firm; managers as cogs in the machine; managers as a cadre of decision-makers; and managers as specific executives. We discuss each in turn.

*Managers as Equivalent to the Firm***.** In the most straightforward characterization, the firm and its managers are interchangeable. This conception builds on the assumption that a managerial group (to the extent it is recognized even to exist) has access to all information within the firm, possesses the same overall objective function as the firm, and can act with the firm’s capabilities at will. Thus, this perspective’s unique insight is that competitive action enactment is not involuntary— the firm must possess information channels to collect the necessary stimuli, the decision-makers (managers or otherwise) must be motivated to act, and the firm must have capabilities (either owned or accessible via networks or markets) to do so. Here, any mention of managers is often in passing and serves as a recognition that a firm cannot decide for itself; someone or some group must do so. The conflation of firms and managers is codified in the terms employed – labeling firms as actors and imparting agency to them (see, e.g., Chen and Miller, 2012, p. 156; Smith et al. 2001).

Another distinctive feature is “firm personification” – treating the managers or decision-makers as homologous to the firm as a collective entity. As Smith et al. (2001, p. 47-48) summarizes the state of the early literature: “scholars of competitive dynamics have closely aligned themselves to the all-knowing assumption consistent with early decision theory (Simon, 1955). Indeed, beyond the framing of papers based on Schumpeterian and Austrian economics, most hypotheses are drawn from information theory or game theory […], which provides completely rational explanations for competitive action: those who have the information will be most aware, motivated and capable of responding.” Early work exploring awareness, motivation, and capability displayed such an orientation when using firm-level variables and referents. For example, Chen and Miller (1994) explicitly draw upon the expectancy-valence motivational frameworks of Vroom (1964) to motivate how firms might respond to competitive threats. Many other studies adopt this firm-centric framing (Young et al. 2000; Gnyawali and Madhavan, 2001; Chen et al. 2007; Yu and Cannella, 2007; Upson et al. 2012). Importantly, this motivation is characterized at the firm level rather than the individual managerial level. More recent research continues to employ this equivalence when appropriate (Tsai et al. 2011; Uhlenbruck et al. 2017). The perspective also corresponds closely to the information processing view of the firm (Galbraith, 1973; Smith et al. 1991), which serves as an early model for probing competitive action and response (Smith et al. 1991; Chen et al. 1992; Smith et al. 2001). The limits of the firm’s information processing capabilities were used to motivate why, for example, smaller firms may act differently than larger ones (Chen and Hambrick, 1995). This view was also standard in fields outside of management looking at competitive responses, such as Robertson and colleagues’ (1995) study of new product announcement signals or Hultink and Langarak’s (2002) study of product launches. In marketing, many studies of competitive response (Bowman and Gatignon, 1995; Aboulnasr et al. 2008) use similar firm-level motivation concepts (e.g., market size, the importance of the market as a fraction of overall sales) to motivate their reasoning.

*Managers as Cogs in the Machine***.** Studies subscribing to this view tend to focus on how managerial roles and capabilities shape the competitive action enactment process. Some studies examine the factors about the decision-making process such as lags between a focal firm’s action and rival reactions (e.g., Bukszar, 2009; Luoma et al. 2017), the use of techniques such as bluffing (Guidice et al. 2009), or predicting competitor moves (Montgomery et al. 2005). Others consider the characteristics of decision alternatives, reasoning that decision-makers consider the potential difficulty or irreversibility of strategic moves (Chen et al. 1992; Chen and MacMillan, 1992). Others examine the choices themselves. For example, the choice of imitation versus alternatives such as non-conformity is of particular interest (Baum et al. 2000; Haveman, 1993; Lieberman and Asaba, 2006; Norman et al. 2007; Semadeni and Anderson, 2010).

 While these studies recognize a distinction between the firm and its decision-makers, the focus is on the decision-making process and its implications, rather than the deciders themselves. The literature on micro-foundations, dynamic managerial capabilities, and organizational learning often informs the managerial roles that may influence a firm’s motivation, awareness, and capability to enact actions. To the extent that the managerial group, as a collective, has differing abilities to notice stimuli, choose appropriately, and coordinate activity, the ability to undertake competitive actions will differ. For example, researchers have examined prior competitive experience (Miller and Chen, 1996), resource management (Bridoux et al. 2013), functional capabilities (Joshi et al. 2010), and coopetition capabilities (Bengtsson et al. 2020). They have also taken a temporal view and consider how learning from competitors brings about Red Queen Competition – such that firms must run faster and faster to maintain their relative position (Barnett and McKendrick, 2004; Derfus et al. 2008; Giachetti et al. 2017). While this perspective enriches the role of managers as a collective group, it gives short shrift to the specific characteristics of individual managers and managerial groups.

*Managers as a Cadre of Decision Makers***.** With the preceding two perspectives, firms and managers are aligned in their awareness, motivation, and capabilities to engage in competitive actions. Furthermore, while both concede that managers may differ in what they can do, managers are ultimately presumed to be homogenous for how they think, what they value, and what drives them. But as the literature on managerial cognition, organizational economics, and executive psychology indicate, these traits and abilities vary across managers. They do not linearly aggregate such that the firm is the simple sum of its parts.

 Starting with cognitions, studies have argued that managers (either specific individuals or groups) perceive the world in different ways (Chen and Miller, 2012, p.152). Importantly, if managers differ in their cognitions, interchanging managers within or between firms will have asymmetric effects on how they identify and perceive competition, their competitors, and their available arsenals of action (Chen and Miller, 2012; Porac et al. 1989; Porac and Rosa, 1996; Gur and Greckhamer, 2019; Reger and Huff, 1993; Livengood and Reger, 2010; Panagiotou, 2007)**.** Others have considered the cognitive representations of the environment managers construct, and how it impacts their conduct in competitive settings such as response speed (Bogner and Barr, 2000; Nadkarni and Narayanan, 2007; Nadkarni and Barr, 2008).

 A small but growing set of studies has considered situations where managers are conceived as agents such that the objective functions of managers and their firms diverge (Offstein and Gnyawali, 2005); other work considers where the objectives of principals differ, too. For example, Connelly and colleagues (2010, 2017) have studied the role of different institutional investor groups on the pattern of firm activity, while Vroom and colleagues (Vroom and Gimeno, 2007; McCann and Vroom, 2014) examine how ownership form and non-financial objectives shape choices regarding specific strategic behavior.

 Similarly, scholars employing psychological tools have begun to probe relevant constructs, such as perceived rivalry, to understand how managers change their behavior in response to these perceptions (Kilduff et al. 2010). Others have employed concepts like the regulatory focus to better understand managerial (in)attention to competitive threats (McMullen et al. 2009).

 While these research streams help advance our understanding of how managerial characteristics mold competitive responses, they treat managers in the abstract – examining one specific dimension or facet in which managers and firms are misaligned – rather than considering them as fully formed, independent entities. The most salient manifestation of such an orientation is reflected in the fact that many of the underlying constructs and processes are often treated as unobservable. Thus, the emphasis is on attempting to proxy for or indirectly shed light on the enactment process. For example, Marcel, Barr, and Duhaime’s (2011) study of executive cognition and competitive dynamics considers executive-focused ‘processing-propensity variables’ such as TMT industry tenure and tenure heterogeneity in combination with some non-executive ‘cue variables’ such as organizational similarity to rivals to understand better how they shape executive cognitive processes (captured by perceived strategic importance).

*Managers as Specific Executives***.** The fourth and final perspective is distinctly grounded in Hambrick and Mason’s (1984) upper echelons view of the firm. To this perspective, managers (particularly senior executives) have a substantive influence on strategic choice because of their collective differences in backgrounds, experiences, values, and the like. It is the sum product of these unique configurations of perceptions, experiences, and values that color the judgments of executives and steer the direction of the firm (particularly in contexts where managers possess high levels of discretion).

Interestingly, top management teams (TMTs) were examined relatively early in the development of the field, providing a rich stream of insights. For example, a long line of research has considered the influence of TMT heterogeneity on competitive aggressiveness (Hambrick et al. 1996; Ferrier, 2001; Hughes-Morgan and Ferrier, 2011; Andrevski et al. 2014). These relationships have subsequently been subjected to multiple meta-analytic reviews (Hughes-Morgan et al. 2018) with mixed conclusions. More recently, studies have probed the conditional nature of these relationships (Bengtsson et al. 2018; Ndofor et al. 2015) in hopes of understanding the conditions under which TMT heterogeneity is most likely to influence competitive behavior. Along the same lines, others have investigated TMT processes such as behavioral integration and its role in shaping competitive aggressiveness (Lin and Shih, 2008; Chen et al. 2010) while others have looked at the role of TMT size (Srivastava and Lee, 2005) or the presence of external ties to other parties (Yoo et al. 2009). Others have examined specific executives such as the CEO and their role in entering new markets (Stephan et al. 2003), or undertaking more diverse moves (Offstein and Gnyawali, 2005).

This research stream has overwhelmingly focused on senior executives because their characteristics have a proportionally more significant influence on firm behavior, which is likely easier to detect (see Andrevski et al. 2014, for an exception). And often, observable demographic characteristics have been employed as a surrogate for underlying cognition, personality, and values (Neely et al. 2020). But over the years, researchers have called for more research on better-specified constructs and a more proximal process to study the effect of senior executives on competitive actions and dynamics (Lawrence, 1997; Smith et al. 1994). Thus, unlike the managers as a cadre of decision makers perspective, the core feature of this perspective pertains to its focus on diverse managerial characteristics and processes as the driver of competitive dynamics, rather than a singular focus on a dimension. But it is also the case that prior studies often lack the necessary granularity to understand how executives enact competitive actions—what actions to take, when, and to what end.

**Collective Reflection and Critique**

As the preceding review reveals, each view tends to focus on a single strand without fully considering the frames implied by the others. While views that personify the firm successfully capture how firms can act with a unity of purpose, they can overly simplify how managers parlay stimuli into actions. Views that consider managers as a reservoir of capabilities capture the utility of managers up and down the hierarchy. Still, they underestimate within-firm heterogeneity of managers or their relative position within the firm. Similarly, considering managers using specific cognitive or agentic lenses sheds light on how their behavior can result in different competitive actions. Still, these perspectives tend to overlook the diversity of personal characteristics of those individuals. Finally, while the managers as specific executives provide a holistic conceptualization of managers, often these individuals’ characteristics considered one person or group at a time or aggregated as average tendencies, without considering the broader social interfaces in which managers themselves are embedded.

We wish to stress two other features of these views that mainly motivate our effort towards a managerial interfaces perspective. First, in examining the attributes, aspirations, and activities of managers to describe, explain, and predict competitive dynamics. They focus overwhelmingly on “who they are” rather than “what they do” or “how they do it” (Hambrick, 1989). Yet, competitive actions, more so than many other organizational initiatives and activities, often call for the mobilization, orchestration, and combination of information and resources disparately held throughout the firm, as well as across the broader business ecosystem and inter-organizational networks. What these views miss is the set of relational interfaces by which the information, insights, resources, cognitions, and capabilities of different actors combine, coalesce, and, at times, collide to produce competitive actions and action repertoires of varying compositions and characteristics. Apart from very small, nascent ventures, it is unreasonable to expect each decision concerning competitive activity is fully vetted by the CEO or a stable senior team. Instead, some of these decisions may be delegated to middle managers, and in some cases, front-line managers (Sengul et al. 2012).

Second, there has been a convenient tendency for researchers to treat competitive actions as outcomes of an unspecified and somewhat mysterious decision-making process. As a result, we currently remain in the dark regarding some fundamental questions regarding the managerial enactment of competitive actions. For example, where do competitive actions come from – particularly novel ones that go beyond the simple imitation of competitors? Who exactly decides to respond to competitors’ actions, and how are those decisions made? Not surprisingly, we currently lack theoretical insights into the decisional and sociopolitical dynamics present in the internal and external “war rooms” of competitive decision-making in which the attributes, activities, and aspirations of managers come into contact to produce a vector of competitive actions and responses (Luoma et al. 2019).

While we refer the reader to the main document for the articulation of a managerial interfaces view, we would like to call attention to the fact that a number of papers have begun to make (perhaps unintended) progress in advancing a managerial interfaces perspective with competitive actions, as compiled in the Appendix Table.

**APPENDIX FIGURE**

Review Methodology

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**APPENDIX TABLE**

**Representative Articles Examining the Intersection of Competitive Actions and Managerial Interfaces**

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| --- | --- | --- | --- | --- | --- | --- |
| **Title** | **Year** | **Author** | **Journal** | **Setting** | **Key Findings** | **Managerial Interfaces Implications** |
| Organizational Information Processing, Competitive Responses, and Performance in the U.S. Domestic Airline Industry | 1991 | Smith, Grimm, Gannon & Chen | Academy of Management Journal | 191 competitive actions and 418 responses in the US domestic airline industry from 1979 - 1986 | Low levels of experience and high levels of education among the managers on a top-level team are positively related to likelihood of response and negatively related to propensity to imitate, average response lag, and average response order | The intersection of different experiential traits appears to influence the competitive decision-making process that occurs “inside the war room” |
| The influence of top management team heterogeneity on firms' competitive moves | 1996 | Hambrick, Cho & Chen | Administrative Science Quarterly | 1,027 competitive actions and 418 responses for 32 major airlines in the US domestic airline industry (1979 – 1986) | Team heterogeneity is a double-edged sword in terms of action speed and likelihood, but its overall net effect on airline performance was positive | Proximal and distal impacts of within-team interfaces may have conflicting effects, whereby links between competitive actions and performance are complex and nuanced |
| The external ties of top executives: Implications for strategic choice and performance | 1997 | Geletkanycz & Hambrick | Administrative Science Quarterly | 30 largest public companies in the branded food and computer industries, 1983 – 1987 | Executives' intra-industry ties are related to strategic conformity, that extra-industry ties are associated with the adoption of deviant strategies, and that alignment of executives' external ties with the informational requirements of the firm's strategy enhances organizational performance | Deviant strategies, or the pursuit of a different set of competitive actions from rivals, may critically depend on the form and relative strength of interfaces “outside the war room” in the context of advice seeking |
| Navigating the competitive landscape: The drivers and consequences of competitive aggressiveness | 2001 | Ferrier | Academy of Management Journal | 224 firm-year observations of leaders and followers across 16 different single-business industries for 7 years | Firm competitive action sequences account for differences in relative performance, and those action sequences are influenced by top management team heterogeneity, past performance, slack, and industry characteristics | Action sequence characteristics such as intensity and duration indicate a pattern of behavior within the war room, which can be explored in greater detail by considering the different social dynamics taking place |
| Getting by with the advice of their friends: CEOs’ advice networks and firms' strategic responses to poor performance | 2003 | McDonald & Westphal | Administrative Science Quarterly | 241 CEOs of companies identified from a random sampling of 600 companies from the Forbes index | Executives' social network ties can influence firms' responses to economic adversity, in particular by inhibiting strategic change in response to relatively poor firm performance | Who executives talk to outside of the war room may influence their perceived need to change tack in the face of competitive pressures |
| Bringing managers into theories of multimarket competition: CEOs and the determinants of market entry | 2003 | Murmann, Boeker &; Goodstein | Organization Science | 395 hospitals in California over a six-year time period | Newer CEOs can direct their firms to act in ways that are inconsistent with their firm’s multimarket position, a potential competitive vulnerability for the firm | CEO tenure has implications for competitive action, but to what extent can this tendency be modified by “steadier hands” in the TMT or board |
| CEO compensation and firm competitive behavior: Empirical evidence from the US pharmaceutical industry | 2005 | Offstein & Gnyawali | Journal of Managerial Psychology | 1,319 actions from 48 major publicly traded pharmaceutical companies in 1999 | Base pay and bonuses of the CEO are higher for firms that launch higher volumes of competitive actions; and the variety of actions seems to influence CEO base salaries | The board and shareholders may be able to use CEO incentives as a lever for potentially altering the decision-making process  |
| How executive SHRM system links to firm performance: The perspectives of upper echelon and competitive dynamics | 2008 | Lin & Shih | Journal of Management | Sample of 627 executives at 254 firms selected from the top 5,000 companies in Taiwan in 2003 | A teamwork-oriented executive SHRM system is positively related to TMT social integration, which in turn is positively related to a firm’s action aggressiveness | The organizational context that interfaces are situated within may influence the relative efficacy of those interfaces to drive competitive action |
| Transformational leadership's role in promoting corporate entrepreneurship: Examining the CEO-TMT interface | 2008 | Ling, Simsek, Lubatkin & Veiga | Academy of Management Journal | Sample of 795 SMEs in New England selected from the D&B Million Dollar Database | Transformational CEOs influence TMTs' behavioral integration, risk propensity, decentralization of responsibilities, and long-term compensation; several of these TMT characteristics impact corporate entrepreneurship | Corporate entrepreneurship is defined, in part, by a subset of competitive actions. This study provides several potential means by which interfaces could affect other action types |
| That's Our Turf! Identity domains and competitive dynamics | 2010 | Livengood & Reger | Academy of Management Review | Conceptual | Managers' perception of the actions by their competitors and psychological motivation to act and capability may affect their likelihood of the reaction to competition within and outside the firm’s identity domain | Perceptions of the competitive context and a firm’s position within that context (identity) may influence which interfaces are more likely to be activated or remain dormant |
| Managerial Interpretations of the Role of Information Systems in Competitive Actions and Firm Performance: A Grounded Theory Investigation | 2010 | Vannoy & Salam | Information Systems Research | Semi-structured interviews with 14 managers within the organization | Findings suggest that when managers envision information systems as a resource that provides opportunities for competitive actions rather than viewing information systems in a service role, competitive advantages can evolve | Interfaces with internal constituents may modify the salience of particular organizational capabilities when envisioning potential competitive actions and responses to rivals |
| Strategic aggressiveness: The effects of gain-thrust schema and core stakeholder salience | 2011 | Karagozoglu & Fuller | Journal of Managerial Issues | Sample of 100 firms from a representative set of SIC codes  | Among other results, companies that balance salience of the core stakeholders are able to counteract tendencies for excessively aggressive strategic actions  | Interfaces between TMTs and their stakeholders could be a key factor “inside the war room” leading to the decision-making mechanisms and competitive actions |
| The influence of executive cognition on competitive dynamics | 2011 | Marcel, Barr & Duhaime | Strategic Management Journal | 271 actions and 599 competitive responses for10 companies in the US domestic airlines industry, 1993 - 1999 | Differences in executives’ cognitive frameworks relate systematically to whether and how quickly they commit their firm to challenge an adversary’s action | Cognitive frameworks are collectively constructed, and the relative emphasis placed on individual contributions may be weighted by power |
| CEO relational leadership and strategic decision quality in top management teams: The role of team trust and learning from failure | 2012 | Carmeli, Tishler & Edmondson | Strategic Organization | Questionnaire administered to 237 alumni of executive MBA . questionnaires (of an initial sample of 500) | Relational leadership of CEO positive associated with TMT trust which positively associated with TMT learning from the failure which positively affects the decision quality (performance) | CEO’s traits may enhance the efficacy by which the top management team operates via socio-behavioral means, driving more precise responses to rival competitive activity  |
| The clock is ticking! Executive temporal depth, industry velocity, and competitive aggressiveness  | 2016 | Nadkarni, Chen, & Chen | Strategic Management Journal | 258 randomly sampled large, established, single business firms listed in COMPUSTAT, 1995 - 2000 | Executive temporal depth exhibited different patterns of relationships with competitive aggressiveness in low- and high-velocity industries. Moreover, competitive aggressiveness had a positive main effect on firm performance, but this effect was stronger in high-velocity industries than in low-velocity industries | The competitive context such as the industry velocity could be a premise of the decision patterns “inside the war room” and results in performance differences |
| Utilizing the firm’s resources: how TMT heterogeneity and resulting faultlines affect TMT tasks  | 2015 | Ndofor, Sirmon & He | Strategic Management Journal | 145 firm-year observations of 49 publicly traded in vitro diagnostic substance manufacturers, 1995 - 1999 | When TMT heterogeneity yields strong faultlines, the positive effect of TMT heterogeneity on converting resources to action is weakened, while the negative effect on converting resources to performance is further strengthened | Appropriately structured interfaces may be able to alleviate the trade-offs between the socio-political aspects of faultlines while maintaining the socio-cognitive benefits of diversity |
| Competitive repertoire complexity: governance antecedents and performance outcomes  | 2017 | Connelly, Tihanyi, Ketchen, Carnes & Ferrier | Strategic Management Journal | 87,941 actions taken by 1,168 firms in 204 industries, sampled from S&P 1500 from 2001 – 2010 | Implementing complex competitive repertoires can be painful in the short term but, if done correctly, can help company performance in the long run; complexity depends, in part, on corporate governance | The ability of an organization to appropriately calibrate the complexity of its repertoire may depend on the balance of power between managers and institutional owners |