THE PROCESS ASPECT OF ENTREPRENEURIAL ORIENTATION-PERFORMANCE RELATIONSHIP: UNCOVERING THE MEDIATING ROLES OF TECHNOLOGICAL CAPABILITIES, INNOVATION AND FIRM GROWTH

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ABSTRACT

Despite the general finding that a positive association exists between entrepreneurial orientation (EO) and performance of the firm, the evidence is not consistent, and there is wide variation in the magnitude of the reported impact. Researchers make the case that the examination of a simple bivariate link, often with constrained methods, provides an inadequate assessment of this focal relationship (Wang, 2008). Accordingly, scholars have called for wide-ranging modeling of the impact of EO on firm performance (Slevin & Terjesen, 2011). We respond to this call by testing a comprehensive, multi-sequential meditational model, with a multi-theoretic approach.

INTRODUCTION

Today’s operating environment is characterized by innumerable challenges: the accelerating growth of new technologies; shortened product lifecycles; a sophisticated, demanding, and globally dispersed client base; and ever-increasing levels of market competition (Covin & Lumpkin, 2011). In this austere environment, profits can be driven to zero among firms offering homogenous or undifferentiated products (Teece, 2007). Organizations that demonstrate an expertise in terms of identifying and exploiting market opportunities are likely to successfully avoid this zero-profit scenario and to develop sustained competitive advantage(s) (Dess, Lumpkin, & Covin, 1997). However, not all firms are equally skilled at entrepreneurship – generally understood as identifying novel opportunities for value creation, exploring new options for existing products, commercializing new products in existing and new markets, and internationalization of new or existing products (Lumpkin & Dess, 1996). One of the cardinal assertions, and central insights, of strategic entrepreneurship literature is that companies embracing an entrepreneurial orientation (EO) are more likely to successfully recognize these unmet entrepreneurial opportunities and, thereby, further strengthen their competitive positions in the market (Keh, Nguyen, & Ng, 2007; Rauch, Wiklund, Lumpkin, & Frese, 2009; Wang, 2008). In this context, EO is defined as “the extent to which firms establish the identification and exploitation of untapped opportunities as an organizing principle of the firm” and the positive effects of EO on organization outcomes and performance has been extensively documented across a range of scenarios (Stam & Elfring, 2008; Wiklund & Shepherd, 2011).

However, despite the general finding that a positive association exists between EO and performance of the firm the evidence is not consistent, and there is a wide variation in the magnitude of the reported impact (Rauch et al., 2009). Researchers make the case that the
examination of a simple bivariate link, often with constrained methods, provides an inadequate assessment of this focal relationship (Wang, 2008). Accordingly, scholars have called for wide-ranging modeling of the impact of EO on firm performance (Rauch et al., 2009; Slevin & Terjesen, 2011). Scholars have answered to these calls with some contingency models (e.g., Stam & Elfring, 2008). We complement by testing a comprehensive, multi-sequential meditational model, employing structural equation modeling. While we address the inconsistency displayed in the empirical evidence with robust models, our primary motivation is theoretical. We concur with Walter et al. (2006) that the link between a firm’s entrepreneurial orientation and desired organizational outcomes, like sales growth and profitability, is not as straightforward as often assumed or reported. Although the theoretical insights presented in the extant literature to explain the EO-performance relationship have immensely broadened our understanding, we contend that a nuanced and more complete theoretical explanation of the relationship is still lacking. The theoretical limitation emanates not from the inadequacies of the anchor theories per se but, rather, from the often monoscopic approach of previous studies. For instance, in the literature, the EO-performance relationship is routinely grounded in RBV logic: that EO constitutes a rare, valuable, inimitable, and often intangible resource, and heterogeneity in the distribution of these resources drives differences in firm performance (Barney, 1991; Wilklund & Shepherd, 2003). We affirm that EO is a strategic resource of the organization with the potential to generate competitive advantage. However, we depart from existing studies that draw primarily on the RBV framework to argue that the differentiating potential of EO, and its corresponding impact on firm performance, depends on the degree to which EO is a precursor to organizational capabilities and innovation. In the absence of such an antecedent linkage, merely adopting EO as a strategic orientation is of limited benefit for the focal firm since EO necessitates an organization to commit scarce resources and also requires substantial learning before the organization becomes entrepreneurial (Rauch et al., 2009). If an EO focus does not dependably lead to enhancement of capabilities and innovation relative to the firm’s competitors, this orientation results in a suboptimal allocation of company assets, which weakens performance (Dess et al., 1997; Rauch et al., 2009). In this undesirable scenario, EO may actually be counterproductive to the growth and survival of a firm. Additionally, entrepreneurial orientation theorists have long advocated that firm processes, structures and behaviors are integral component of EO (Lumpkin & Dess, 1996). Arguably, the influence of a phenomenon on organizational performance is likely to be complicated if the phenomenon is reflected on processes, structures and behaviors of an organization. In fact, we maintain that evidence on the EO-performance relationship unequivocally indicates a complex process. Building our narrative off the extant works, we address this multifaceted theoretical conundrum by invoking, and integrating, resource based theory, dynamic capabilities theory, and first mover advantage rationale to theorize the focal relationship between EO and firm outcomes. We present an overarching thesis that multiple theories govern the causal link between EO and performance and evaluate our theoretic perspective using a multi-sequential construct framework where the focal relationship is jointly mediated by technological capability, innovation, and growth.

Our investigation makes three distinct contributions. First, by extending the theoretical horizon of the EO-performance relationship and empirically testing a comprehensive model, we contribute to strategic entrepreneurship literature in general. More particularly, theorizing on the process pathways aspect of the EO-performance link, we believe, adds critically to entrepreneurship literature. In the light of ongoing conversations among strategy researchers on the nature of relationship between assets and capabilities and their impact on firm performance (Lisboa, Skarmeas, & Lages, 2001; Grant, 1996; Teece, Pisano, & Shuen, 1997), we theorize that
resources and capabilities are independent but must work in concert to exert a favorable bearing on firm performance. The results of our empirical analysis convincingly support this position and, as such, contribute to the broad strategy literature as well. Finally, our model depicts the mechanics or complex sequence through which entrepreneurial strategic orientation translates into financial gains for an organization. The empirically corroborated insights have immediate implications for practitioners – especially in the context of gaining a sustained competitive advantage in challenging and constantly altering environments.

Conceptual Development

In explaining why some firms excel while their rivals may flounder, scholars have theorized that firm-level assets explain observed variances in organizational performance (Eisenhardt & Martin, 2000; Newbert, 2008). The assertion that differences in tangible and intangible resources account for the heterogeneity encountered in firm outcomes within an industry forms the core intellectual foundation of the resource based view (RBV) of the firm (Helfat & Peteraf, 2003; Peteraf, 1993; Teece et al., 1997). In this paradigmatic perspective, ownership of idiosyncratic resources, or in the RBV lexicon, assets that are valuable, rare, inimitable, and imperfectly substitutable (sometimes referred as VRIS attributes), lead to sustainable competitive advantage and abnormal positive returns (Eisenhardt & Martin, 2000) and also offer the potential for monopoly or oligopoly rents (Newbert, 2008; Barney, 1991; Wiklund & Shepherd, 2003). Expanding on this core insight of RBV, strategic entrepreneurship researchers have argued that an EO is one of those unique resources that leads to competitive advantage (Green et al., 2008; Rauch et al., 2009; Wiklund & Shepherd, 2003). In contemporary markets, globalization and technological advancements create significant hurdles and opportunities for the firm, thereby increasing the criticality of organizational resources such as an EO. We propose that two core dimensions of EO (Matsuno, Mentzer, & Oszsomer, 2002) - proactiveness and innovativeness – are particularly well-suited to permit entrepreneurially focused firms to capitalize on the opportunities brought about by these external forces (cf., Brown & Eisenhardt, 1995; Wiklund & Shepherd, 2003). Reflecting the inherent characteristics of these two dimensions, entrepreneurial firms constantly scan and monitor their operating environments to seek out and identify new product opportunities (Keh et al., 2007) and then pursue these untapped market prospects more aggressively than their competitors, reaping the corresponding rewards (Rauch et al., 2009). Since the skills required to be entrepreneurially oriented are unequally distributed across firms in an industry (Wiklund & Shepherd, 2003), companies possessing an EO should outperform their rivals. In this manner, EO (and particularly the sub-dimensions of proactiveness and innovation) can be viewed as an idiosyncratic resource, consistent with the VRIS attributes advocated in RBV, which bestows the focal firm with strategic advantages in product markets (Barney, 1991; Eisenhardt & Martin, 2000).

The Need of a Multi-theoretical Explanation of EO-Performance Relationship

Although RBV has been widely used to support the linkage between EO and firm performance (Newbert, 2008), we depart from the prevalent view to argue that this (single theory) approach is too limited in scope and, therefore, may not explain the full range of outcomes associated with EO. In RBV perspective, VRIS resources such as EO are expected to enhance the competitive standing of the focal firm (Eisenhardt & Martin, 2000). However, EO can be a “double edged sword” in that it may benefit, or hurt, the performance of the organization. We argue that potential negative outcomes associated with EO result from vulnerabilities corresponding to its risk...
taking dimension (Matsuno et al., 2002). In particular, the “focus orienting” benefits attributed to risk taking may be countervailed by negative consequences in other areas. First, driven by a risk taking propensity and coupled with overly optimistic executives (Busenitz & Barney, 1997), entrepreneurially focused firms are more likely to overestimate the potential value and desirability of various strategic input factors. We believe that one outcome is that these companies may be more susceptible to selecting inappropriate supply chain partners, have redundant raw material inventories, have excess work-in-process inventories, and maintain over-stocked finished goods inventories. These inventory holding expenses often represent a significant percentage of overall operational cost in many business organizations (Raman & Kim, 2002). Given the evidence that small and medium scale enterprises are often capital constrained (Parker & van Praag, 2006), these expenditures could have negative implications for the firm. Second, exogenous forces, owing to globalization and major technological shifts, pose a myriad of challenges. This phenomenon has rendered the competition in almost every industry as “cut-throat” by shortening product life cycles, making consumers more value conscious and informed, and potentially limiting barriers of market entry for new firms (Lisboa et al., 2011). In this environment, if a resource constrained firm wrongly siphons its resources away from their optimal allocation by unnecessarily deploying them on risky initiatives, there can be adverse financial consequences.

Stepping back, we observe that EO exerts both positive and negative influences on firm performance. However, RBV’s insights are applicable only on some parts of the big picture in explaining the observed range of outcomes; this perspective primarily provides only a general or abstract answer to the “why” component of the EO-performance relationship (i.e. EO is a valuable, rare, and difficult to copy resource) but not the “how” component. RBV does not illuminate the complex path sequence through which EO translates into financial outcomes. Without the ability to discern the process or sequence of steps connecting EO and performance, RBV provides a useful but still inadequate depiction of this focal relationship. Hence, to understand the range of outcomes associated with EO, as well as to explain both the “why” and “how” of the EO-performance link, the RBV perspective needs to be complemented by other theoretical concepts related to firm capabilities and innovation.

Multi-theoretical Perspective: RBV, Dynamic Capabilities, & First Mover Advantage

One strand of theoretical interpretation regarding RBV deems assets of the firm, as well as the capabilities for transforming these assets, as bound together in a unified resource (Grant, 1996). However, more recent discourse, with which we concur, views an organization’s resources and capabilities as being largely independent of each other (Lisboa et al., 2001). For example, firms in an industry could possess, or have access to, similar assets; however, due to patent protections, organizations may own proprietary competencies for transforming these common resources into valuable products and services that command higher margins (Newbert, 2008). Put simply, we view resources and capabilities as autonomous. For firms to demonstrate sustainable competitive advantage – and earn abnormal positive returns – they must possess either/both unique resources and/or capabilities (Newbert, 2008).

To capture the autonomy of organizational resources and competencies, the theory of dynamic capabilities (DC) is profusely used. DCs represent an organization’s accumulated knowledge and complex skill sets (DeSarbo et al., 2005; Teece, 2007), which provide the firm with a distinctive proficiency to acquire, integrate, transform, and deploy resources in a manner that is more
advantageous than its competitors (Helfat & Peteraf, 2003). Of course, not all DCs add value to a firm because these competencies can be expensive to acquire and/or implement. As such, their deployment will be most appropriate when there are clear opportunities for competitive advantages (Winter, 2003). One such opportunity for competitive advantages is represented by technological capabilities (TC) (Teece et al., 1997). TCs denote the firm’s ability to perform various technological functions (i.e. cost reduction, production efficiency, etc.) including the expertise to leverage firm resources, such as EO, leading to the development and commercialization of new products (DeSarbo et al., 2005; Di Benedetto et al., 2008). Indeed, TCs are “viewed as one of the most important sources of sustainable competitive advantage” because it is problematic for other firms to duplicate these skills and the corresponding ability to transform EO, and other firm resources, into favorable corporate outcomes (Coombs and Bierly, 2006). The foregoing discussion suggests that EO is antecedent to, and drives investments in, TC. In the absence of such a linkage, adopting EO as organizational policy orientation may be of minimal benefit because a focus on EO requires a commitment of scarce resources (Rauch et al., 2009). If this orientation does not stimulate an improvement in TCs, then firm performance may suffer as a result of a non-optimal allocation of time and money (Dess et al., 1997). Therefore, the first step in the overall framework connecting EO and performance is the direct link from EO to TC. In turn, TCs are believed to drive organization innovation (Zhou & Wu, 2010). Subsequently, innovation spurs companies to grow and prosper by exploiting new and/or unmet entrepreneurial opportunities (Newbert, 2008). The potential benefits of being first to innovate and commercialize a new product are referred to as the first mover advantage (FMA) or, also, pioneer advantage (Kerin et al., 1992). The first mover, by virtue of creating a new product market and owning this category before any competitive response, generates abnormal positive profits due to monopoly rents (Urban et al., 1986). Importantly, the advantages arising from pioneering are based on two theories: an economic perspective and a consumer behavior perspective (Lieberman & Montgomery, 1988). In the economic viewpoint, the first mover is able to pre-emptively control assets, raw materials, and supply chains vital to the manufacture of the pioneer brand (Golder & Tellis, 1993; Urban et al., 1986). The economic assets may be physical, human, geographic, or even shelf space in a retail outlet. Asset pre-emption creates significant barriers to entry for competition (Kerin et al., 1992), allowing the first entrant to earn monopoly rents over extended time periods. In addition, the pioneer most often maintains cost advantages over later entrants since it is further along the manufacturing learning curve and garners the corresponding cost benefits associated with its economies of scale that later entrants are unable to match (Urban et al., 1986). FMA is also supported by the technological leadership displayed by the pioneer entrant (Lieberman & Montgomery, 1988).

The benefits earned by the first mover can also be viewed through a consumer behavior lens. Reinforcing its market leading position, the pioneer entrant is able to define consumer attitudes in a new market. This allows the new brand to mold perceptions to match its product offering and claim the most advantageous product positioning (Carpenter & Nakamoto, 1989). This ability to influence consumer attitudes and, in essence, create the most desirable product space forces competitors to settle for disadvantageous product positions. First movers also benefit from greater levels of cognitive processing and consumer learning (Kardes & Kalyanaram, 1992). More specifically, consumers spend more time encoding information on a new brand since the product is innovative and novel; a later entrant receives less cognitive processing because it is naturally viewed as redundant and less interesting. As a result of this difference in terms of consumer learning and cognitive effort, the pioneer brand demonstrates a higher level of recall, even on attributes or qualities shared by other brands in the same category (Kardes & Kalyanaram, 1992).
Finally, these scholars note that the differential consumer learning in favor of the first mover also causes more extreme (i.e., more favorable) judgments that are held with greater conviction. While both the economic and consumer behavior perspectives reinforce the benefits corresponding to the first mover, the latter helps to explain the durability of FMA even under scenarios with minimal economic switching costs. Based on the amalgamation of three theories or rationales—RBV, DC, and FMA—a more robust and complete picture of the multiple, alternative pathways connecting EO and performance emerges. In the simplest viewpoint, based only on RBV, EO directly impacts performance. As previously discussed, this monoscopic perspective is likely to be incomplete as it provides an insufficient explanation of “how” this orientation leads to favorable outcomes for an organization. In our proposed multi-step conceptual model, EO is antecedent to TC (based on RBV and DC); in turn, TC leads to organization growth and superior financial performance (based on FMA). Hence, this final model reflects a five-step pathway from EO to TC to innovation to growth to performance. Other scholars have suggested linking literature streams from RBV and FMA to support pioneering benefits (Lieberman and Montgomery, 1998); however, we believe that our conceptual model is more comprehensive in that it reveals additional linkages detailing the process by which EO is a resource leading to innovation, which is subsequently connected to market leadership via growth and financial performance. We predict that the comprehensive model will prove superior to various nested models grounded on single-theory approach.

Impact of EO on Technological Capabilities

RBV, or the notion that heterogeneity in rare, valuable, and inimitable assets drives variation in firm outcomes is at the core of explaining organization performance (Barney, 1991). Recent literature, however, describes resources and capabilities as being largely independent of each other (Lisboa et al., 2001). That is, firms in an industry could have access to similar resources; nonetheless, due to legal protections (for example), organizations may hold proprietary methods for converting these common resources into distinctive products commanding higher profit levels (Newbert, 2008). In addition to variation in firm capabilities, assets may also be differentially distributed across organizations: some firms are able to pre-emptively control scarce raw materials, supply chains, and other manufacturing inputs. Hence, firms must possess either distinctive resources and/or capabilities to earn abnormal positive returns (Newbert, 2008). These unique proficiencies of the firm are referred to as dynamic capabilities (DC) (Eisenhardt & Martin, 2000), and represent the organization’s amassed knowledge and skills (DeSarbo et al., 2005; Teece, 2007). DCs “are the drivers behind the creation, evolution, and recombination of other resources into new sources of competitive advantage” (Eisenhardt & Martin, 2000: p. 3). In this framework, where resources and capabilities are independent, EO is an intangible asset of the firm. By itself, EO may not necessarily promote favorable financial outcomes (Lisboa et al., 2011; Walter, 2006). Rather, these resources drive competitive advantage only when they are transformed into valuable new products via DCs (Zollo & Winter, 2002). Although firms may possess different types of DCs, scholars have highlighted technological capabilities (TC) as particularly important to successful outcomes (Teece et al., 1997). TCs are viewed as a strategic competency that drives firm enhancements and innovation (DeSarbo et al., 2005) via an entrepreneurial orientation. Indeed, Teece (2007: p. 1319) notes that firms possessing dynamic capabilities are “intensely entrepreneurial.” Thus, we contend that EO is antecedent to TC: an organization’s assets must first be in place before TC can transform these resources (i.e., an EO) into useful product innovations (Lisboa et al., 2011; Teece, 2007). Hence, EO is an immediate precursor to, and positively impacts, TC. This leads to our first hypothesis.

H1: EO is positively related to technological capabilities.
Impact of TC on Innovation

Technological capabilities (TC) develop over time and refer to an organization’s ability to use and deploy multiple technologies (Zhou & Wu, 2010). Investments in TCs are thought to motivate R&D developments, cost reductions, product improvements, and increased efficiencies related to manufacturing processes and supply chains leading to enhanced competitiveness (DeSarbo et al., 2005; Di Benedetto et al., 2008). While TCs provide an organization with the ability to perform a wide variety of technological functions, the formation of TCs can also be the impetus for the creation of new products. This latter benefit is particularly important since it describes a connection between TCs and the ability of a firm to innovate. More specifically, we postulate that investments in TC drive innovation at the focal company (Zhou & Wu, 2010).

\[ H2: \text{Technological capabilities are positively related to innovation.} \]

Impact of Innovation and Growth on Financial Performance

Firms that are skilled at innovation are able to cultivate and commercialize new products, thereby beating their rivals to market. As a result, the market leader earns monopoly rents during the time period before later entrants are successfully introduced. This phenomenon is referred to as the first mover advantage (FMA) (Kerin et al., 1992), and the basis for this advantage is firmly grounded in both economic and consumer behavior theory. First, the pioneer brand is able to protect its market leading position by pre-emption of physical, human, and geographic assets (Lieberman & Montgomery, 1998). Second, the first mover is able to define consumer attitudes in the just-created market, allowing the new brand to both mold and claim the most desirable product space (Carpenter & Nakamoto, 1989). This ability to influence consumer attitudes and carve out unique product positions allows pioneer brands to maintain an enduring competitive advantage over later entrants, even when the economic switching costs are low (Kardes & Kalyanaram, 1992). Hence, an innovative firm that launches the first entrant “owns” the category for an extended period of time, accruing monopoly rents and the corresponding abnormal positive returns (Urban et al., 1996). This profit differential, in favor of the innovative organization, logically drives their growth and superior financial performance (Di Benedetto et al., 2008). Thus, organization innovation positively effects both firm growth and financial performance.

\[ H3: \text{Innovation is positively related to organizational growth.} \]
\[ H4: \text{Innovation is positively related to financial performance.} \]
\[ H5: \text{Organizational growth is positively related to financial performance.} \]

Mediation of the Positive Links from EO, TC, and Innovation to Financial Performance

Overall, we postulate the EO-performance relationship is a complex, five-step pathway. In particular, we propose a construct sequence that spans from EO to TC to innovation to growth to financial performance. We argue that the straightforward two-construct model connecting EO and performance is grounded on the RBV perspective. The addition of TC as an intervening variable between these focal constructs is justified based on dynamic capabilities. Finally, drawing on the insights of FMA, we propose innovation and organizational growth leads to financial performance; thus, it is an inevitable link on the EO-performance relationship. Therefore:

\[ H6: \text{The positive link between EO and financial performance is collectively mediated by technological capabilities, innovation, and growth.} \]
METHODS

Data Collection and Sample

We tested the proposed models with cross-sectional data obtained by surveying a simple random sample of small and medium scale enterprises (SMEs) in a US metropolitan area using a sampling frame provided by the Small Business Administration office. CEOs, business founders, and other senior executives who could respond on behalf of their organizations were invited to complete the survey. We received 164 usable responses from 400 invitations. The 41% response rate of our survey was similar to previous studies in the context of SMEs (Steensma, Marino, Weaver, & Dickson, 2000). We tested for non-response bias with an extrapolation technique. No significant differences were found between scores of early and late respondents. We also assessed the general characteristics of our data relative to samples in previous studies to ensure that our study participants were representative of the desired sample. The results were satisfactory: the mean age of firms (38.59 years, SD = 29.78) and mean size of firms in terms of number of employees (83.44, SD = 96.86) were comparable to Wiklund & Shepherd (2003).

Measures

We measured financial performance of the organizations with a reflective scale consisting of four self-reported measures of financial performance provided by the chief executive or other senior manager: return on assets (ROA), return on investment (ROI), net profits, and profits to revenue ratio. The company executives were asked to rate performance of their firm relative to major competitors in the industry on a 5 point Likert scale [1 = much worse than the competition, 5 = much better than the competition]. While performance can also be assessed using objective accounting measures, we chose subjective measures since it is unlikely that SMEs, which tend to be privately held, will provide objective assessments of their performance. We note that the use of subjective measures of performance is a common, valid practice in organizational research (e.g., Stam & Elfring, 2008). We used a well-established entrepreneurial orientation scale with 8 items reflected on its three dimensions – innovativeness, risk taking and proactiveness - (Matsuno et al., 2002). The scale consists of three items for innovativeness, three items for risk taking and two items for proactiveness rated on a 5 point Likert scale [1 = strongly disagree, 5 = strongly agree]. We theorized EO as a second-order construct, rather than a first order construct, similar to most of the extant research on EO (cf. Rauch et al., 2009). For technological capability of a firm, we used an existing and validated 5-indicator scale by DeSarbo et al. (2005). We asked the respondents to report on their firm’s technological capability relative to their major competitors in the industry. It was measured on a 5 point Likert scale [1 = much worse than competition, 5 = much better than competition]. We captured materialized innovation of the firms with three indicators: new product and service development, new market development for existing products, and development of new markets. Finally, we created a “growth” scale with two growth indicators: growth over the last three years and market share gain over the last three years of the focal firm, relative to the competitors in the industry. We used similar 5 point Likert scale for innovation and growth. A host of variables was taken into account for this study that were either previously shown to influence the performance of SMEs or that could be expected to affect SME performance on theoretical grounds. These variables include: firm age, measured in years since organization inception (Stam & Elfring, 2008; Wiklund & Shepherd, 2003); firm size, in terms of the number of employees (Stam & Elfring, 2008; Wiklund & Shepherd, 2003); R&D intensity of the firm, measured using
the item “investment in R & D aimed at new innovations relative to major competitors”; consumer perceptions of service quality (Martínez & Martínez, 2010), employing a single item measure; and, employee turnover of the focal firm relative to their major competition. A 5 point scale [1 = much worse than the competition, 5 = much better than the competition] was used in all controls.

Analysis

Overall analytical approach and model fit. We employed SEM techniques for testing our theoretical model, using LISREL 8.8 with maximum likelihood estimator. Following convention, we report multiple measures of model fit, including comparative fit index (CFI), goodness of fit index (GFI), root means square error of approximation (RMSEA), standardized root mean square residual (SRMR) (Kline, 2005), and normed chi-square (chi-square to degrees of freedom ratio) (Jöreskog & Sörbom, 1996). Although our sample size, n = 164, is fairly adequate, given the complexity of our proposed model and the number of parameters to be estimated, it was not possible to model all of the observed variables and their latent constructs. Therefore, we created parcels of items for each latent construct that had four or more items (cf., Little et al., 2002). As recommended, we parceled on both empirical and theoretical grounds, as appropriate (Little et al., 2002). Because technological capability is a unidimensional construct, we parceled it with a random approach. On the other hand, for the multidimensional second order factor, EO, a domain-representative approach [parceling by grouping indicators across dimensions] was appropriate. This approach of parceling allowed us to account for both common variance and unique variance of the dimensions of EO (cf. Little et al., 2002). Finally, for financial performance, it made sense to create a parcel out of ROA and ROI, and a second parcel from net profits and profits to revenue ratio. Our measurement model exhibited excellent fit as NC (X²/d.f.) = 1.69 < 3, CFI = .96 > .90, GFI = .91 > .90, RMSEA = .06 < .08, and SRMR =.04 < 0.08 (Kline, 2005). Further, we examined the magnitude of factor loadings of all the constructs and the associations between error terms across constructs – more particularly the effect sizes of constructs that were hypothesized in our theory. The lowest loading was 0.63 for one of the innovation indicators; all others loaded 0.73 or better (standardized). We also looked at the magnitude of modification indices for factor loadings in the measurement model. There were only two substantial modification suggestions with more than 10 units (11.59). It suggested the financial performance item parcels could load on the growth construct implying that chi-square could be decreased (Jöreskog, & Sörbom, 1996). Given that growth parameters and financial performance are often lumped together as a part of a broad measure of organizational performance, this modification suggestion was all but natural. However, because our theory separates the growth parameters from financial performance parameters, we inferred it as theoretically non-threatening suggestion. Empirically, the solid discriminant validity (cf. analysis below) provides additional insight that it is a minor modification suggestion.

Construct reliability and construct validity. We measured internal consistency of construct scales with traditional Cronbach’s alpha as well as with scale composite reliability [Raykov’s rho]. As demonstrated in table 1, all of the predictor variables and criterion variables, as well as controls, demonstrate excellent reliability. Cronbach’s alpha ranged from 0.74 for innovation to 0.91 for performance - higher than the suggested 0.70 level. Researchers contend that Cronbach’s alpha may result in a biased estimation of reliability, particularly for the multidimensional constructs such as entrepreneurial orientation (Raykov, 1997). Therefore, following the recommendations we calculated scale composite reliability for all the latent constructs in our model using the formula suggested by Fornell & Larcker (cf. Netemeyer et al., 1990). The scale composite reliabilities
were strong; they ranged from 0.75 for innovation to 0.91 for financial performance, well above the minimum required threshold of 0.60. We established the construct validity of all the latent constructs by demonstrating convergent validity and discriminant validity. Evidence for convergent and discriminant validity was evaluated in multiple ways. For convergent validity, we first looked at the “t” values of the factor loadings. We found that they were very high [12.24, 13.77, and 14.57 for EO; 11.54, and 18.07 for TC; 10.12, 8.13, and 9.77 for innovation; 11.97 and 12.76 for growth; and 16.13 and 13.82 for financial performance.] suggesting a strong convergent validity (Netemeyer et al., 1990). Second, as demonstrated in table 1, the average variance extracted for all the constructs were well above the recommended threshold of 0.5 (Netemeyer et al., 1990). Finally, the scale composite reliability estimates of latent constructs were greater than their average variances extracted for each construct. On the other hand, for discriminant validity, if the correlation between any two constructs is less than square roots of average variance extracted for those constructs, it suggests discriminant validity among these constructs (Gefen, Straub, & Broudeau, 2000). Therefore, we computed and judged the magnitude of the correlation between the constructs against the square root of the average variance abstracted. The correlations [the descriptive statistics and correlation table available upon request – currently not included in appendix for space constraint] among the five latent constructs, EO, TC, innovation, growth and financial performance ranges from 0.23 (between technological capability and growth) to 0.71 (between growth and financial performance). On the other hand, the square roots of AVE are 0.87, 0.89, 0.71, 0.84, and 0.92 for EO, TC, innovation, growth, and financial performance respectively. Since the highest correlation, 0.71, between growth and financial performance, is less than 0.84 and 0.9 (the corresponding square roots of AVE), discriminant validity is established. Finally, we constrained the measurement model by treating two endogenous variables as a single factor, one at a time [models M2 through M4 in table 2]. The better fit of the overall measurement model relative to all the constrained models provides clear and strong support for discriminant validity. In addition, we also tested the EO factor structure conducting two-order hierarchical factor model, basic congeneric model, and other possible alternative models. The fit indices of second order factor structure (table 2) were superior to fit indices of all other factor structures of EO, providing clear evidence of EO being a second order factor [comparison analysis available upon request].

Normality, multicollinearity and common method variance. We checked for the normality assumptions and multicollinearity and did not find any issues. We took many suggested ex ante measures to reduce common method variance (CMV), and also conducted ex post analysis to make sure CMV was not an issue (Podsakoff et al., 2003). For example, we selected a variety of scale anchors and positioned them strategically in the survey instrument to minimize item characteristic effects, such as a common anchor scale producing common variance. We also carried out multiple diagnostic tests to rule out the possibility of substantive common method variance. First, we conducted Harman's single-factor test using principal component factoring. Only 17.37 % of the total variance was explained by a single factor, which is much less than 50 % threshold for CMV to be an issue (Podsakoff et al., 2003). Because model fit increases for progressively more complex models (that is, the final measurement model is better than alternative models M2-M4; and M2-M4 are better than M1, which is the simplest or most constrained model), we inferred that this outcome also provides additional evidence that the data do not suffer from serious common method variance (cf. Iverson & Maguire, 2000). Finally, we tested the degree of common method variance by assessing the method effects of an unmeasured latent method factor (M6 in table 2) (Podsakoff et al., 2003). The latent common method factor extracted only approximately 28% variance, much less than the 50% threshold for substantive common method variance (Podsakoff et al., 2003).-
**RESULTS**

**Hypothesis Tests**

First, as exhibited in table 1, the structural equation model exhibited an excellent overall fit (NC (χ^2/d.f.) = 1.66 < 3, CFI = .96 > .90, GFI = .91 > .90, RMSEA = .06 < .08, and SRMR = .05 < 0.08; Hair et al., 2006; Kline, 2005). The results are presented in figure 1. All the mediated paths, represented by H1 through H5, are significant at p < .01, with strong magnitude (coefficient values range from 0.22 for the EO-TC link up to .61 for the Growth-Performance link) of the relationships. The overall appropriateness of the mediation effects are corroborated in two ways. First, our structural model specification includes a direct path from the theorized exogenous latent variable (EO) to final endogenous latent variable (financial performance), permitting us to make the case of joint significance of the mediation links. Second, the SEM output furnishes the total indirect effects and total effects of an exogenous variable on the ultimate endogenous variable along with the standard error and “t” values of the indirect effects. That, in turn, allowed us to evaluate the significance of overall mediation effects of EO, which is .04 (unstandardized) and is significant at p < .05 level. Therefore, the comprehensive process model of EO-performance relationship is supported.

**Robustness Checks.** For additional confidence in the results of our analysis, we carried out multiple robustness checks based on two distinct rationales. First, possible reverse causality of the structural relationships can be one of the major sources of endogeneity. Therefore, we ran a SEM in which all the hypothesized structural relationships were causally reversed (model S1 in table 2). Although this alternative model has acceptable model fit, it is a worse fitting model relative to the hypothesized structural model. Thus, we safely assume that reverse causality is not an issue, and our results are robust. Second, we wanted to check the robustness of the mediation effects. Principally, we wanted to assess the significance of the mediational roles of particular constructs because the overall significance of the mediation structure was evident from the two tests conducted above. Model S2 through S5 represent the alternative models for that purpose. We added and removed paths in the structural equation to evaluate the particular roles. For instance, to gauge innovation’s role in the overall scheme of the process model, we dropped the link between TC and innovation and we added a link to growth from TC. As the fit statistics in table 2 reveal, the alternative models, S2 to S5, are worse relative to the theorized comprehensive model. Also, note that the worst model is the one where all mediators are dropped from the equation simultaneously. This provides additional support for our multi-step mediational framework.

**DISCUSSION AND CONCLUSION**

The theoretical ambition of our investigation emanated from the constraints in the extant studies. Whereas there is a general consensus in the strategic entrepreneurship domain that EO-performance is a complex relationship, the extant theoretical treatment (i.e. RBV) is too constrained. Therefore, concurring with other scholars, we see the necessity for a more comprehensive theoretical structure. Accordingly, we challenged this single theory approach by proposing a comprehensive, five-step mediational model, and by making an overarching case for bridging multiple theories to explain the EO-performance association. While we converged with other scholars on the importance of RBV as a crucial theory, we departed to advocate the
significance of dynamic capabilities theory and first mover advantage. Our central thesis is the EO’s impact on financial performance transmits in the form of enhanced technological capabilities. It also manifests in the higher degree of innovation for the focal firm relative to the competitors in the product markets – facilitated by the first mover advantage. The empirical results of SEM vindicated our theoretical narrative. Despite our efforts to address a significant theory void, we are aware that our inquiry is probably not without limitations. For one, various mediational links in our theory might actually have conditional relationships with each other rather than simple direct links. However, limitations like this should provide further theory building opportunities for researchers. Similarly, methodological limitations also remain in this study. For example, although we tested the endogeneity owing to reverse causality among structural relationships, because of the cross sectional data, we could not test the effect of time-induced endogeneity. We are also cognizant that the control variables included in our analysis are certainly not exhaustive.

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References


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**Figure 1**

Results of SEM Model with Latent Constructs

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Notes:

(a) The dashed arrows represent measured but not hypothesized relationships
(b) The regression coefficients reported are standardized. Control effects are not shown for aesthetic reasons. (c) ROA = return on assets, ROI = return on investment; PRR = profits to revenue ratio
(d) All factor loadings reported are significant at p < .05 level 
   (e) **p < .01; ***p < .001
### Table 1
Model Fit, *Average Variance Extracted (AVE), Scale Composite Reliability (Rho) & Cronbach’s Alpha*

<table>
<thead>
<tr>
<th>Models [Description]</th>
<th>NC (χ²/df)</th>
<th>CFI</th>
<th>GFI</th>
<th>RMSEA</th>
<th>SRMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Entrepreneurial Orientation (EO); Second-order Factor Structure</td>
<td>1.15 (19.53/17)</td>
<td>.97</td>
<td>.03</td>
<td>.04</td>
<td></td>
</tr>
<tr>
<td>2. Measurement Model</td>
<td>1.69 (74.94/80)</td>
<td>.96</td>
<td>.06</td>
<td>.04</td>
<td></td>
</tr>
<tr>
<td>3. Structural Equation Model</td>
<td>1.66 (146.25/88)</td>
<td>.96</td>
<td>.06</td>
<td>.05</td>
<td></td>
</tr>
</tbody>
</table>

**Constructs**

<table>
<thead>
<tr>
<th></th>
<th>RHO</th>
<th>AVE</th>
<th>ALPHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entrepreneurial Orientation</td>
<td>.90</td>
<td>.75</td>
<td>.86</td>
</tr>
<tr>
<td>Technological Capability</td>
<td>.88</td>
<td>.79</td>
<td>.81</td>
</tr>
<tr>
<td>Innovation</td>
<td>.75</td>
<td>.50</td>
<td>.74</td>
</tr>
<tr>
<td>Growth</td>
<td>.82</td>
<td>.70</td>
<td>.82</td>
</tr>
<tr>
<td>Financial Performance</td>
<td>.91</td>
<td>.85</td>
<td>.91</td>
</tr>
</tbody>
</table>

*Average variance extracted and scale composite reliability presented for all the predictor variables were calculated from the measurement model using well-recognized Fornell & Larcker (1981) formula. n = 164, for all models.

### Table 2
Robustness Checks for Measurement Model and Structural Equation Model

<table>
<thead>
<tr>
<th>Alternative Measurement Models</th>
<th>Purpose of Check</th>
<th>NC (χ²/df)</th>
<th>CFI</th>
<th>RMSEA</th>
<th>SRMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1. EO treated as one-dimensional first-order factor</td>
<td>Multipurpose</td>
<td>3.09 (244.94/170)</td>
<td>.88</td>
<td>.11</td>
<td>.08</td>
</tr>
<tr>
<td>M2. Technological capability and innovation treated as one factor</td>
<td>Multipurpose</td>
<td>3.48 (510.02/89)</td>
<td>.89</td>
<td>.12</td>
<td>.11</td>
</tr>
<tr>
<td>M3. Innovation and growth treated as one factor</td>
<td>Multipurpose</td>
<td>2.46 (219.17/89)</td>
<td>.93</td>
<td>.10</td>
<td>.06</td>
</tr>
<tr>
<td>M4. Growth and financial performance treated as one factor</td>
<td>Multipurpose</td>
<td>2.28 (202.73/89)</td>
<td>.93</td>
<td>.09</td>
<td>.05</td>
</tr>
<tr>
<td>M5. Only 5 latent variables in the model</td>
<td>CMV</td>
<td>1.67 (15.34/45)</td>
<td>.98</td>
<td>.06</td>
<td>.04</td>
</tr>
<tr>
<td>M6. Common method factor added to M5</td>
<td>CMV</td>
<td>2.12 (201.91/98)</td>
<td>.93</td>
<td>.08</td>
<td>.08</td>
</tr>
</tbody>
</table>

**Alternative Structural Models**

| S1. All the hypothesized structural relationships reversed | Endogeneity | 2.00 (176.10/88) | .95 | .08 | .06 |
| S2. TC → Innovation link dropped and TC → growth link added | Innovation’s role | 1.82 (169.13/88) | .95 | .07 | .06 |
| S3. EO → Innovation link and EO → growth link added | EO’s role | 1.74 (149.18/85) | .95 | .07 | .07 |
| S4. Innovation → growth link removed | Growth’s role | 1.80 (160.16/89) | .95 | .07 | .07 |
| S5. EO → TC dropped, TC → innovation dropped, EO → innovation added | TC’s role | 1.90 (167.12/88) | .95 | .07 | .07 |
| S6. All the mediating links simultaneously dropped | All mediators’ role | 2.07 (180.24/90) | .94 | .08 | .09 |

*Although we tested additional alternative models, for brevity, only theoretically plausible alternative models are presented. CMV = common method variance. n = 164, for all the models.