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Abstract

We examine how strategic entrepreneurship affects explorative and exploitative product innovation and how their synthesis as innovation ambidexterity affects firm performance. We find that opportunity-seeking through entrepreneurial orientation positively affects both explorative and exploitative innovation, but advantage-seeking through sourcing and managing relational resources show differential effects on innovation activity. Those that achieve innovation ambidexterity experience superior firm performance. Our work contributes a first test of strategic entrepreneurship as it applies to product innovation management in new and young technology-based firms, and offers a model reconciling how opposing constructs contained in strategic entrepreneurship and innovation theory can cohabitate in firms.

Introduction

Innovation is a fundamental strategy that firms must adopt to successfully compete and grow in today's complex market environments. However, firms young and old continually struggle to innovate consistently. Innovation efforts are repeatedly undermined as environments become more dynamic and firms experience fluctuations in their resource availability and ability to transcend short-term flux for long-term growth. For these reasons, the pursuit of innovation calls for multiple factors to be accounted for, including the type of innovation (He and Wong, 2004), the sourcing of resources and their allocation (Debruyne et al., 2010; Sherwood and Covin, 2008; Yu et al., 2010), and the entrepreneurship of the firm (de Brentani et al., 2010; Li et al., 2008). It is perhaps unsurprising then that recent studies in innovation management have called for a better understanding of resources and entrepreneurship in innovation (de Brentani et al., 2010), a new theoretical view of entrepreneurship and innovation (Litan and Song, 2008), and a better understanding of balancing conflicting demands in the innovation process for new ventures (Song et al., 2010). What perhaps is surprising is that such an evaluation is yet to emerge.

Traditionally, firms orient themselves towards either 'exploitative' product innovation based on incremental additions, new refinements or cost improvements to existing products, or, 'explorative' product innovation based on new possibilities, creative ideas, and experimentation to shape truly distinct and new radical products (Dittrich and Duysters, 2007; He and Wong, 2004; March, 1991). However, recent studies into product innovation management suggest a balance is needed, where managers are expected to organize for both exploitative and explorative innovations at the same time: those that pursue both product innovations successfully can obtain superior business performance (He and Wong, 2004) and those that do not fall into mediocrity (March, 1991).

Contemporary product innovation management is then about managing contradictory forces. In theory, explorative innovation relies on variance-inducing activities at the firm level to fuel the discovery of new product possibilities (March, 1991); but exploitative innovation relies on choice-inducing activities to fuel the refinement of better (but not 'new') product possibilities (March, 1991). This dichotomy is compounded by the fact that both innovation strategies compete for scarce resources (Voss et al., 2008) and rely on different resource-based and entrepreneurial activities (Hughes et al., 2007) to secure advantage. This problem is acute for new and young firms because excellence at seeking opportunities is counterbalanced by inadequate resources to generate innovation (Ireland et al., 2003); the result is that one innovation tends to draw resources from the other leading one to flourish while the other is neglected (Voss et al., 2008). We contest that strategic entrepreneurship can shed light on this problem.

Strategic entrepreneurship captures how firms create and manage change (Ireland et al., 2003). Creating change, or creating innovation, is seen as a product of two opposing activities: opportunity-seeking behavior and advantage-seeking behavior. We propose that opportunity-seeking behavior is a function of the entrepreneurial orientation of the firm (Miller, 1983). By promoting and undertaking risk tolerant, innovative, and proactive behavior, the firm is expected to develop a competency at identifying a stream of rich opportunities to fuel innovation. However, opportunities alone cannot create innovation as innovation is also dependent on the resources available to the firm (de Brentani et al., 2010). Firms pursuing strategic entrepreneurship seek new opportunities (i.e., opportunity-seeking behavior) either to disrupt an industry's existing competitive conditions (with exploitative innovations) or to create new market spaces (with explorative innovations) by remodeling its resource base (i.e., advantage-seeking

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behavior) (Ireland et al., 2003). New and young venture technology-based firms are particularly prone to liabilities of newness in the form of a weak resource base that contains little depth or slack. Most resources then tend to be dedicated to its present activities and will likely yield little more than exploitative innovation as a result (Voss et al., 2008). But, a new and young venture firm can develop a network of relational ties to access resource (termed as 'relational resources' as they originate from and are located in a firm's relations with others) that change its system of constraints (Pfeffer and Salancik, 1978), enabling it to potentially generate explorative innovations (Voss et al., 2008).

The logic for the benefits of strategic entrepreneurship are intuitive, but its implementation is difficult owing to the complexity of managing entrepreneurial and strategic actions simultaneously within one firm and mitigating dangers of disparate effects that may occur on innovation. Still, firms that are strategically entrepreneurial ought to balance entrepreneurial orientation and resource management to achieve both innovations, given it is concerned with harnessing creative potential and resources to amplify innovation. Strategic entrepreneurship therefore offers a novel theoretical and conceptual platform to evaluate innovation management, and one that: addresses calls for a better understanding of resources and entrepreneurship in innovation (de Brentani et al., 2010); provides a theoretical means of combining entrepreneurship and innovation (Litan and Song, 2008); and, improves understanding of balancing conflicting demands in the innovation process for new ventures (Song et al., 2010).

Our research questions are: (1) How does strategic entrepreneurship affect product innovation outcomes in new and young technology-based firms? (2) Do explorative and exploitative product innovation endeavors affect business performance in new and young technology-based firms and is innovation ambidexterity superior? Our contributions include: (1) a first test of strategic entrepreneurship model as it applies to innovation management; (2) a conciliatory model reconciling how opposing constructs contained in strategic entrepreneurship and innovation theory can cohabitate in firms by gap-filling the weaknesses of the other; (3) a demonstration that by balancing both explorative and exploitative innovation through innovation ambidexterity, new and young technology-based firms can generate positive performance returns; and (4) the offering of a new theoretical base on which to build further scholarly research and managerial insights into innovation management.

Theoretical framework and hypotheses

New and young firms are typically skilled at identifying rich and novel entrepreneurial opportunities but much less skilled at sourcing and coordinating the resources needed to exploit these opportunities. This is due to liabilities of age and size. But firms adept at both have the capacity to disrupt existing markets, products, and competitors while building new market spaces. Thus, the decline into mediocrity foretold by March (1991) when firms cannot achieve exploitative and explorative innovation should not happen.

Ireland et al. (2003) see opportunity-seeking behavior as a product of an entrepreneurial mindset, entrepreneurial leadership, and an entrepreneurial culture within a firm. These are operationalized by a firm's entrepreneurial orientation. Entrepreneurial orientation captures the mindset, behaviors, and accompanying processes within the firm to seek out and pursue novel opportunities (Hughes and Morgan, 2007). Entrepreneurial orientation is multidimensional, and encompasses the firm's actions relating to product-market and technological innovativeness, risk-taking, and proactiveness (Miller, 1983).

More than just entrepreneurial orientation is needed to manage pursue innovation, however. Translating entrepreneurial opportunities into productive market offerings requires resources (Yu et al., 2010). Ireland et al. (2003) encapsulate this as advantage-seeking behavior in a construct labeled 'managing resources strategically'. Grounded in the resource-based view of the firm, the strategic management of resources involves actions taken to form, bundle, and leverage the resources needed to shape innovations that bear competitive advantages (Sirmon et al., 2007). Increasingly these resources lie outside of the firm's boundaries (Sherwood and Covin, 2008). New and young firms lack a rich resource base to draw on internally because of their newness and small size. In place, these firms can make extensive use of relational resources to fill gaps in their resource portfolio (Ketchen et al., 2007), changing the constraints facing the young firm (Pfeffer and Salancik, 1978). Thus, we define advantage-seeking behavior in terms of managing relational resources strategically.

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New and young technology-based firms with an entrepreneurial orientation and a collaborative orientation can therefore set the foundations for strategic entrepreneurship as a means to manage innovation. Recent studies in the product innovation management literature lend support for intelligent resource management and an entrepreneurial strategic posture as important ingredients for innovative firms (de Brentani et al., 2010). The strategic entrepreneurship model put forward by Ireland et al. (2003) proposes that innovation mediates the relationship between entrepreneurial orientation and managing relational resources and firm performance.

Innovation is dictated by a firm's *motivation* and *ability* (Debruyne et al., 2010). Entrepreneurial orientation creates a bias for action that *motivates* firms to persistently seek market-based entrepreneurial opportunities for change. Entrepreneurially oriented firms seek to be first to introduce products, innovations, and technologies by exploiting opportunities ahead of competitors (Hughes and Morgan, 2007; Miller, 1983). Such firms seek to shape markets. Taken together, these qualities ought to fuel explorative and exploitative product innovation search as a means to enact the opportunities found by the firm. Entrepreneurial orientation is ultimately driven by a desire to disrupt competition (Hughes and Morgan, 2007), which manifests itself in either disturbing existing product-market conditions or spearheading the development of new market space or both (Ireland et al., 2003).

Managing relational resources strategically then brings in the resources that *enable* the innovation process (Ketchen et al., 2007) and provide the ability to instigate innovations (de Brentani et al., 2010; Debruyne et al., 2010). An abundance of resources brought into the firm enables the young and new venture to experiment with new resource combinations while learning to refine existing ones (Ireland et al., 2003; Sirmon et al., 2007). Thus, explorative and exploitative product innovations should emerge as the firm's motivation to disrupt markets is matched with the ability to build new and better products. However, this *understates* the challenge for young and new venture firms in meeting the resource needs of explorative and exploitative innovation activities. Relationships allow firms to tap external resources for exploration and enables firms to expand resource to quickly target new opportunities but doing so can distract from core activities (exploitative innovations).

In new and young firms, a lack of internal resources means that the vast majority of internal resources will be devoted to current product-market offerings. If external resources are brought in to encourage explorative activities, this will draw on scarce internal resources. This is inevitable because to access relational resources a firm must reciprocate in some form, and to explore new ways forward, the firm must connect relational resources with its own resources, capabilities, and expertise. The exploitative innovation activities of the firm will then be undermined as internal resources are drawn to fuel this endeavor. When internal resources are directed towards exploration, they are pulled from exploitation activities (March, 1991). External resources cannot directly plug this gap because such resources are normally novel to the firm and so direct attention towards exploration without correcting the loss of internal resources from present product-market activities. Voss et al.'s (2008) discussion of small firms and the dilemma of [un]absorbed-[non]generic resources for innovation activity is particularly pertinent. Voss et al. (2008) reveal that unabsorbed non-generic resources lead to higher exploration and lower exploitation whereas absorbed generic resources encourage more exploitation innovation activity. Their results point towards pragmatic trade-offs in the decision-making of new and young firms.

A second aspect of this advantage-seeking behavior is the extent of the firm's relational embeddedness. The extent to which the firm is relationally embedded in its ties determines the extent to which its network consists of predominately strong ties. The quality of social relations in general improves with greater relational embeddedness, and acts as a mechanism for knowledge transfer because more cohesive ties increase knowledge sharing among partners (Inkpen and Tsang, 2005). This can help a new or young firm to plug knowledge gaps brought on by liabilities of newness. As relational embeddedness increases, more knowledge is transferred but less non-redundant information exists over time and novelty is reduced (Granovetter, 1973). We expect that while increased knowledge enables the new or young venture firm to learn to do better with the resources it has, improving exploitative innovation, increases in knowledge redundancy and a lack of novelty detract from its ability to invest in explorative innovation. Our position view is also supported by the work of Dittrich and Duysters (2007).

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We propose that explorative and exploitative innovations ought to create performance rewards for firms. But the returns to explorative product innovation are long term and so, initially, new and young firms should accrue stronger performance rewards from exploitative innovation (March, 1991). Drawing on the innovation ambidexterity thesis (He and Wong, 2004), we further propose that those firms able to balance both innovation types can secure performance rewards. While both innovation types are resource intensive (Voss et al., 2008), strategic entrepreneurship should enable both forms of innovation and should address the organizational, resource, and knowledge challenges presented by each type. Those firms that can then go forward to reconcile both innovation types can secure returns to firm performance.

Our hypotheses for new and young technology-based firms are as follows:

- H1: Entrepreneurial orientation is positively related to explorative innovation.
- H2: Entrepreneurial orientation is positively related to exploitative innovation.
- H3: Managing relational resources strategically is positively related to explorative innovation.
- H4: Managing relational resources strategically is negatively related to exploitative innovation.
- H5: Relational embeddedness is negatively related to explorative innovation.
- H6: Relational embeddedness is positively related to exploitative innovation.
- H7: Exploitative innovation is positively related to firm performance.
- H8: Explorative innovation is positively related to firm performance but less so than exploitative innovation.
- H9: Innovation ambidexterity is positively related to firm performance.

Methods

U.K.-based incubating, new and young technology-based firms formed our sample population. This sample was generated using the United Kingdom Business Incubation (UKBI) directory of incubator facilities and cross-referenced with internet and archival searches. We identified 196 facilities in total. We screened each incubator to ensure we capture only those containing new and young technology-based firms, identifying 53 'general' incubators for removal. A list of the new and young technology-based firms within each incubator was then generated and a random sample of 1,000 firms was drawn.

Exploratory interviews were held with five firms and two incubator managers prior to a quantitative study. Our exploratory interviews identified the *lead entrepreneur* in each firm as the most relevant informant, defined as the founder or top management team leader (chief executive officer or managing director). Our interviews established that acquiring multiple informants would prejudice the cooperation of these firms with the survey and would not improve the quality of the data because these single informants had wide, significant, and largely exclusive knowledge. We implemented a mail survey and pre-tested the survey instrument with academic researchers and our initial interview respondents. We also contacted senior members of UKBI, regional development agencies, and other non-government organizations. Minor amendments were made to the survey instrument. Pre-notification, a survey and information pack, and two follow-up reminders were mailed respectively to sampling units.

In total, 211 responses were received. We tested for non-response bias using the extrapolation method and found no statistically significant differences at conventional levels between groups of early and late respondents. To assess informant validity, we asked respondents about their knowledge regarding the questions asked in the survey—anchored (1) *no knowledge* to (7) *full knowledge* (mean = 6.23, SD = 0.92)—and the perceived accuracy of their responses in relation to the 'realities' of their business—anchored (1) *not at all accurate* to (7) *very accurate* (mean = 6.03; SD = 0.97).

Measures were sourced from previous studies with small modifications made to account for context. Items were anchored (1) '*strongly disagree*' to (7) '*strongly agree*'. Items for entrepreneurial orientation and its three dimensions of risk-taking, innovativeness, and proactiveness were sourced from Hughes and Morgan (2007). Managing relational resources strategically was operationalized by items from Sarkar et al. (2001). Relational embeddedness was measured using items from Andersson et al. (2002). Measures for explorative innovation and exploitative innovation mirror Jansen et al.'s (2006) scales. We calculated ambidexterity by calculating a score of innovation ambidexterity quality that is

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adjusted by the degree of imbalance present in the firm. We operationalized business performance as the 1-year lagged net profit performance of the firm. We controlled for firm age.

We followed protocols for limiting common method variance (CMV) within the questionnaire. Tests for CMV within our data (a *Harman one-factor test* using confirmatory factor analysis, and a *marker variable test*) revealed no evidence of CMV. Using confirmatory factor analysis, we estimated a single measurement model with excellent fit to the data (CFI = 0.96; IFI = 0.96; NNFI = 0.95; RMSEA = 0.07). Each item loaded significantly ($p < 0.01$) onto the specified construct (ranging from 0.50 to 0.93); the construct reliabilities all exceed thresholds for acceptable reliability; and the average variance extracted ranged from 0.51 to 0.79, evidencing convergent validity. The only exception is the 'Exploitative Innovation' construct but its construct reliability is sufficient (0.67). The square root of the AVE for each construct is greater than the off-diagonal coefficients, evidencing discriminant validity.

Results

Hypothesis testing was based on structural equation modeling. Entrepreneurial orientation positively affects explorative innovation (H1) ($t = 7.48; p \leq 0.01$); managing relational resources (H3) also positive impacts explorative innovation ($t = 1.42; p \leq 0.10$); relational embeddedness is negatively related to instances of explorative innovation (H5) ($t = -1.47; p \leq 0.10$); entrepreneurial orientation (H2; $t = 5.84; p \leq 0.01$) and relational embeddedness (H6; $t = 2.60; p \leq 0.01$) are both positively related to exploitative innovation; and, managing relational resources (H4) is negatively related to exploitative innovation ($t = -2.43; p \leq 0.01$). We hypothesized that firm performance would be positively influenced by exploitative (H7) and explorative (H8) innovation, but that this relationship would be weaker for explorative innovation as its benefits take longer to accrue. H7 is supported ($t = 2.01; p \leq 0.05$), however, a negative relationship is found between explorative innovation and one-year lagged net profit ($t = -2.45; p \leq 0.01$). Innovation ambidexterity (H9) is positively related to performance ($t = 1.65; p \leq 0.05$), as predicted.

Discussion and contributions

Entrepreneurial orientation emerges as a key factor in motivating exploitative innovation activity and in enabling the firm to obtain the performance benefits that accrue from these innovations. Relational embeddedness is also an important contributor to successful instances of exploitative innovation. However, managing relational resources negatively impacts on instances of exploitative innovation, which theory leads us to believe occurs as a result of internal resources being redirected to be re-bundled with externally-sourced resources in pursuit of explorative innovation when the firm prioritizes external relations as sources of resources. This is supported by the positive relationship found between managing relational resources strategically and instances of explorative innovation. These findings suggest a worrying lapse is present in recent treatments of resource bundling and resource orchestration (Sirmon et al., 2007), which have failed to anticipate negative consequences to the firm's innovation activities when bundling, structuring, and leveraging new resources brought into the firm. Exploration depends on being able to combine newly-sourced resources with those already existing internally within the firm to undertake new, but uncertain, innovation projects. Larger firms can absorb these resource redirections or re-bundling events owing to greater resource slack (Voss et al., 2008), but this is far less possible in new and young technology-based firms as the internal resource stock is generally low and specific to its present product-market activities. Our findings are symptomatic of the lack of treatment of explorative and exploitative innovation activities in young and new venture firms. Taken together, these findings contribute to answering calls in the innovation management literature for a better understanding of resources and entrepreneurship in innovation (de Brentani et al., 2010) and a better understanding of balancing conflicting demands in the innovation process for new ventures (Song et al., 2010).

Our results for explorative innovation raise important issues. The strongest motivator of explorative innovation is once again an entrepreneurial orientation. But in contrast to the results for exploitative innovation, managing relational resources demonstrates a positive impact on explorative innovation activity while relational embeddedness has a negative effect. We suggest managers and scholars devote their attention to further unravel the contingency conditions that affect the relationships between strategic entrepreneurship and product innovation activity. Our findings suggest that efforts to

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locate, draw on, and apply relational resources directs individuals to generate new knowledge and understanding about organizational resources that allows them to be combined in novel and previously unrelated ways. This lends support to Ireland et al.'s (2003) proposition that in operating in a strategically entrepreneurial manner, drawing on and leveraging the social, capital of the firm to access additional network resources is an important facet of leveraging the resources of the firm towards developing new innovations. Thus we contribute to both strategic entrepreneurship and innovation management literatures by unraveling how external collaborative efforts might alter the firm's landscape for innovation.

Our final contribution relates to the body of knowledge that is accumulating about the performance consequences of explorative and exploitative innovations and innovation ambidexterity. As expected, exploitative innovation yield positive returns to business performance in terms of the firm's success at appropriating profits from its product market offerings, and has a superior effect in comparison to explorative innovation. Explorative innovation exhibited a significant negative effect on 1-year lagged net profit performance. We do not interpret this as evidence of the unhealthiness of explorative innovations for young firms. Rather, we consider that because exploration innovation demands significant investment it appears to 'burn cash' in the short term. Consequently, our findings indicate that the costs of explorative innovations take much longer to recover for these firms and their reward in absolute profit terms is at least greater than 12 months. These findings support emerging evidence that exploration can have negative short-term effects on performance (Auh and Menguc, 2005). However, we do find support for innovation ambidexterity as a means to improve performance for young and new technology-based firms. By successfully balancing innovation strategies, firms can benefit from exploration without suffering its cost to establish a platform for longer-term sustainability.

Conclusion

The chief contributions of our work are new knowledge on how strategic entrepreneurship provides conditions supporting explorative and exploitative innovation, and a map of the conflicts and challenges that emerge from balancing opportunity-seeking and advantage-seeking behaviors in pursuit of innovations. Our research demonstrates that these conflicts are reconcilable by drawing on the patterns of effects around EO, managing relational resources strategically, and relational embeddedness.

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