Innovation Purity: Revisiting the Exploration-Exploitation Debate

O. Branzei[a] and S. Thornhill[b]
[a]York University, Schulich School of Business, N328, 4700 Keele St, ON ON M3J 1P3 Toronto, Canada
[b]University of Western Ontario, Richard Ivey School of Business, ON ZIP CODE CITY, Canada

Principal Topic

Trade-offs between the "exploitation of old certainties" and "the exploration of new possibilities" (March, 1991: 71) have long occupied a prominent place within the literature on learning and innovation (Levinthal & March, 1993; Nelson & Winter, 1982). Theoretical simulations, grounded investigations, and empirical analyses yield largely pessimistic forecasts. They suggest that exploitation often traps firms into suboptimal yet stable equilibria (Ahuja & Lampert, 2001; Levinthal & March, 1993), where firms not only get to know significantly less than they could but they also learn at a slower rate than relevant environmental changes may require (March, 1991), with self-destructive long-run consequences (Brenner & Tushman, 2002; Holmqvist, 2004). Alternatively, exploratory actions that increase variance in a firm's knowledge sets, routines, and capabilities stimulate innovation and learning (Hargadon, 2002), often have significant short-term costs (Fisher & Ittner, 1999). The trade-off argument posits that, because exploration and exploitation exert countervailing forces on resources and strategies, firms are more successful when they focus on one or the other. Depending on the benefits sought, they periodically cycle between the two extremes (Holmqvist, 2004). Recent research, however, suggests that firms deliberately seek a balance between exploration and exploitation (Branzei, 2005; Gitleman & Kogut, 2003). However, maintaining an optimal mix is challenging-given "[their] certainty, speed, proximity, and clarity of feedback" (March, 1991: 73), exploitation cycles are more tempting to initiate and harder to break, and thus often lure firms away from exploration. Opposite arguments co-exist in the literature. On one hand, a long tradition in learning curve advantage (Darr, Argote & Epple, 1995) and competitive advantage (Barney, 1991; Porter, 1985) suggests that focusing on one at the expense of the other yields superior payoffs. The attention-based view of the firm corroborates this prediction, suggesting that pure exploration or exploitation better mobilize resources and talent and thus is more likely to attain the desired results. Alternatively, March and his adherents have consistently argued for the benefits of 'balancing' the two, suggesting that an optimal mix helps firms attain both short-term cost advantages and long-term positioning advantages.

Methodology/Key Propositions

This study proposes and tests a contingent effect, whereby at low levels of innovation intensity (low degrees of exploration and/or exploitation) balance is more beneficial, whereas at high levels of intensity a pure exploration or a pure exploitation approach yields greater payoffs. We focus on the effects of exploratory and exploitative product innovation activities on gains in operating margin relative to peer (using a 3 year lag) as our indicator of competitive advantage. Firm-level data on exploration and exploitation are obtained from the Innovation Survey -a representative multi-industry sample of 5,944 manufacturing CEOs/senior executives. The sample was doubly-stratified across 31 industries and 12 geographic regions and achieved a 95% response rate. Fourth AGSE International Entrepreneurship Research Exchange February 6-9 2007 Brisbane Australia Abstract

We map firms' product innovation activities within a two-dimensional space, as illustrated. Exploration (X) and Exploitation (T) are measured as % of revenues generated by new or improved products, respectively, over a three year period. Performance measures are obtained from secondary sources. We control for industry effects and each firm's size, experience and capabilities

The bi-dimensional product innovation space of each firm is described as:

$$\text{Innovation Purity}(\theta) = \text{Arctan}(T/X) \quad (1)$$

$$\text{Innovation Intensity}(R) = \sqrt{T^2 + X^2} \quad (2)$$

The two terms R and theta (θ) represent polar coordinates in product innovation space (Thornhill & White, 2003). A firm with a very high or very low value for theta occupies a position of relative purity in the T -X space. Firms that lie close to the 45 degree slope line occupy the middle ground in this innovation space. R represents the radial distance from the origin. Learning curve theorists suggests that pure positions channel attention and resources to the areas where they add the most value and thus should outperform those in the middle zone of innovation space: H1a: There is a curvilinear, U-shaped relationship between innovation purity (theta) and competitive advantage. Alternatively, March, Cohen and Levinthal might argue that focusing on one or the other yields suboptimal results, and that a mix of X and T is more likely to lead to superior results. H1b: There is a curvilinear, inverse U-shaped relationship between innovation purity (theta) and competitive advantage. We also argue that the level of innovation intensity (R) determines whether firms benefit most from a pure focus on exploration or exploitation or by attempting to balance the two, such that higher levels of intensity place greater strain on attention and resources and thus dilute the benefits derived from doing some of each. H2: Innovation purity (theta) is more beneficial at higher levels of innovation intensity (R).

Results and Implications

This study suggests that purity is more beneficial to pure exploiters or pure explorers at high levels of innovation intensity, but more beneficial to firms with a balanced innovation portfolio at low levels of intensity. This 2-D mapping approach has the potential to resolve a fundamental point of contention in the innovation literature, as well as provide a tool for managers to evaluate innovation strategy.

Contact

Oana Branzei. York University, Schulich School of Business, N328, 4700 Keele St, ON ON M3J 1P3 Toronto, Canada.
(T) 416 736 2100 x20685, (F) , Email: obranzei@schulich.yorku.ca