MODES OF KNOWLEDGE ACQUISITION AND INNOVATION IN DIFFERENT ENVIRONMENTS: AN EXAMINATION OF NEW FIRMS

Alexander McKelvie
Syracuse University, USA, mckelvie@syr.edu

Johan Wiklund
Syracuse University, USA

Larry Bennett
Syracuse University, USA

Recommended Citation
McKelvie, Alexander; Wiklund, Johan; and Bennett, Larry (2008) "MODES OF KNOWLEDGE ACQUISITION AND INNOVATION IN DIFFERENT ENVIRONMENTS: AN EXAMINATION OF NEW FIRMS," Frontiers of Entrepreneurship Research: Vol. 28: Iss. 19, Article 5.
Available at: http://digitalknowledge.babson.edu/fer/vol28/iss19/5
MODES OF KNOWLEDGE ACQUISITION AND INNOVATION IN DIFFERENT ENVIRONMENTS: AN EXAMINATION OF NEW FIRMS

Alexander McKelvie, Syracuse University, USA
Johan Wiklund, Syracuse University, USA
Larry Bennett, Syracuse University, USA

ABSTRACT

Knowledge about markets and technology are essential to the discovery and exploitation of opportunities for innovation. In this paper, we examine the modes of new knowledge acquisition (i.e. market vs. technological) practices and their effect on innovation in a sample of over 300 new firms and try to answer the question of 'what knowledge matters in what situations'. We find a diverging impact for the mode of knowledge acquisition, depending on the level of dynamism of the environment. In stable and predictable environments, market knowledge is vital for innovation. However, in dynamic markets, market knowledge had a negative impact on innovation. Technological knowledge showed no differences across differing environments. Implications for theory and practice are discussed.

INTRODUCTION

Several streams of research converge on the idea that knowledge is essential to the discovery and exploitation of opportunities for innovation (e.g., Shane, 2000; Zahra & George, 2002). These claims have been substantiated in a number of empirical studies (e.g., Cooper, Folta & Woo, 1995; Keh, Nguyen & Ng, 2007; Shane, 2000; Thornhill, 2006; Matusik & Heeley, 2005; Tsai, 2004).

Knowledge for innovation poses special challenges for new ventures because much of the needed knowledge is not readily available within the new organization, but nevertheless needs to be acquired. New ventures face liabilities of newness, which are derived from a wide variety of organizational learning problems (Stinchcombe, 1965), such as the creation and learning of new roles and routines and learning about the environment in which the firm is to do business (Aldrich, 1999).

To date scholars have examined the need for new ventures to acquire market knowledge (Yli-Renko, Autio & Sapienza, 2005) or technological knowledge (Hayton & Zahra, 2005). However, these streams of research have developed rather independently of each other. Therefore, we know little about the relative importance of the two and under what conditions their effectiveness might vary. In this paper, we develop a conceptual model that incorporates both these strands of knowledge and that identifies contextual factors influencing the relative importance of each. We then test this model on a sample of over 300 new firms in Sweden. This is an important contribution to the literature because: (a) A framework that captures both types of knowledge and their relative importance is more complete and has greater generality than a single eyed focus on one of the types of knowledge; and (b) New ventures have limited resources and knowledge acquisition is costly. Our framework and empirical results help address the question of when new ventures should invest resources into the acquisition of market or technological knowledge.
THEORY & HYPOTHESIS DEVELOPMENT

For the most part, previous studies examining knowledge and innovation have adopted either a market or a technological approach. We build on this research first arguing for the direct positive effects of acquiring market and technological knowledge before turning to explaining how new knowledge may have varying usefulness, depending on environmental dynamism.

Market Knowledge and Innovation

Market knowledge is knowledge of customer wants, needs, and processes. It is a long-held belief within the marketing orientation and Austrian economics literatures that more market knowledge is better for responsiveness to customer needs and the discovery of opportunities. A central tenet of Austrian Economics, which is highly influential in Entrepreneurship research, is that individuals differ in their levels of knowledge (Hayek, 1945). The essence of discovering new opportunities is to be alert to changes in market demands so that one can exploit any opportunities that are viewed (Kirzner, 1997). Simply put, the more you are aware, the more opportunities you can spot. Similarly, from a marketing orientation perspective, increased levels of knowledge allow a firm to have more up-to-date understanding of customer problems, an increased ability to determine the potential commercial value of any market changes, and a superior ability to be able to match offerings to what the customer perceives as valuable (Narver & Slater, 1990). A firm’s ability to discover shifts in customer needs and customers’ willingness to pay for new things form the basis of opportunity and innovation (Kohli, Jaworski & Kumar, 1993). In other words, like Austrian economics, the marketing orientation literature suggests that the more knowledge a firm has of customer wants, the better able to respond to new opportunities.

While the logic behind these arguments is rather simple and straight-forward, there is substantial empirical support to substantiate the claims (cf. Shane, 2000). Furthermore, the notion of being abreast of current market situations implies that a firm constantly acquires new knowledge, and does not simply rest upon its current stocks of knowledge. For instance, empirical studies display benefits for innovation of continuously scanning environments in search of shifting market demands and potential new market openings (Gaglio & Katz, 2001), maintaining up-to-date accurate understanding of main market issues from end customers (Von Hippel, 1986), and acquiring information from other market contacts (Cooper, Folta & Woo, 1995). As such, we argue that:

H1: Higher levels of market knowledge acquisition will be positively related to innovative output.

Market Knowledge, Environmental Dynamism and Innovation

The nature of the task environment that organizations compete in influences their innovative behavior (Subramaniam & Youndt, 2005). Therefore, the task environment is commonly considered in studies that examine variance in innovation (Garcia & Calantone, 2002; Suarez & Lanzolla, 2007). Consequently, based on prior research, consideration of the external environment appears relevant when assessing the relationship between knowledge on the one hand and innovation on the other.

Environmental dynamism represents the degree of instability or turbulence in the environment manifested in key operating concerns such as market and industry conditions, and general technological, economic, social, and political forces (Khandwalla, 1977). A dynamic environment
is characterized by a high rate of change in market trends and industry innovation as well as unpredictability of the actions of competitors and customers (Miller, 1983). The shifts in demand and conditions typical of a dynamic environment are likely to entice firms to release new offers in order to stay competitive.

If demands and technologies change rapidly, future outcomes are unknown, and customer demand is highly unstable and fast changing, identifying customer needs becomes much more difficult (Golder & Tellis, 1993), which may render traditional planned approaches to business futile. There is a high possibility that the prediction of future demand will be wrong (Porter, 1985). Therefore, the collection of information about the market, and acquisition of knowledge about the needs of customers is likely to be less relevant in dynamic environments. On the other hand, if the environment is stable the characteristics described will be the opposite. That is, it will be relatively easier to plan ahead and to foresee the future wants and needs of customers and the development of new technology. This leads to the following hypothesis:

**H2:** The greater the (a) Market Dynamism and (b) Technological Dynamism of the task environment, the smaller the impact of Market Knowledge Acquisition on Innovative Output.

**Technological knowledge**

Technological knowledge refers to the knowledge of manufacturing, engineering, or producing methods or tools needed to serve the market. Technological knowledge has been characterized in a great number of ways, including the skills, backgrounds and experiences of individuals within the firm, the functional ability of the resources within the firm, the learned knowledge that one acquires from the scientific and engineering activities within the firm, such as R&D (Nerkar & Roberts, 2004; Bierly & Chakrabarti, 1996; Tsai, 2004). Indeed, there is vast evidence suggesting that technological knowledge and innovation are highly related (e.g. Katila & Ajuha, 2002).

Traditionally, new technological knowledge is acquired via internal R&D practices and other scientific activities (Tsai, 2004). However, other activities such as attending conferences, scanning trends or acquiring external technology have been shown to be particularly effective for new firms (Lee, Lee & Pennings, 2001; Tsai & Wang, 2008). Nonetheless, acquiring new technological knowledge is important for innovation as it allows the firm to evaluate a novel potential opportunity due to expertise in designing an optimal structure, manufacturing process or reliability of a new technology (McEvily & Chakravarthy, 2002). In turn, this may lead to an economic or cost-related advantage or increased understanding of competitors’ moves (Cohen & Levinthal, 1990). Furthermore, new technological knowledge allows the firm to increase its “production set”, and thus its actual ability to produce a new good or to quickly respond to changing competitive landscapes or new opportunities (Grant, 1996; Helfat, 1997). Finally, new technological knowledge can lead to a firm’s ability to create a radical or break-through technology, which can have a significant impact on the market (Abernathy & Utterback, 1978). In sum, acquiring new technological knowledge allows the firm to create new innovations or respond to new external threats. We therefore suggest that:

**H3:** Higher levels of technological knowledge acquisition will be positively related to innovative output.
Technological Knowledge, Environmental Dynamism and Innovation

As stated in the above, technological knowledge equips the new venture with the ability to rapidly develop new products and services. In a highly dynamic environment, an alternative to trying to predict the future wants and needs of customers is to instead use the technological knowledge to develop new products and services that try to shape the way customers behave (Gopalakrishnan & Bierly, 2001). Deep understanding of technology facilitates firms’ abilities to use their own internal knowledge to develop products and services that are different from what competitors are offering (Teece, 1986). However, in higher velocity environments, accurately developing relevant solutions to changing needs and abilities may entail a large amount of experimentation, learning-while-doing, testing new technological solutions, and partial implementation of multiple options. This means acquiring higher levels of new technological knowledge so that the firm can create various fallback positions and devise new options for future behavior (Eisenhardt & Martin, 2000). In other words, in dynamic markets, it appears that access to technological knowledge is more important than in stable environments. This leads to the following hypothesis:

\[ H4: \text{The higher the (a) Market Dynamism and (b) Technological Dynamism of the task environment, the larger the impact of Technological Knowledge Acquisition on Innovative Output.} \]

METHOD

Sample

In line with previous studies (e.g. Yli-Renko et al., 2001), we define new firms in terms of their age. The sample consisted of all incorporated firms in Sweden in the TIME sector (Telecom, Information Technology, Media, and Entertainment) founded between 1995 and 2003. All firms were therefore at most ten years old during the data collection. These sectors represent an appropriate context to study knowledge acquisition and innovation, as they are known as being knowledge-intensive, and innovation is frequent and of paramount importance for competitive advantage (Zahra & Bogner, 1999). In many other sectors, innovation is very among new ventures. Firms in their first year of operation and firms with fewer than three employees were excluded because in order to only include ‘serious’ firms and those that were likely to acquire new knowledge. Thus, our sample frame represents a theoretically relevant population for studying the relationship of interest, although findings will not be generalizable to the universe of all new firms. The CEO was the key informant for this study, as is common in studies of new firms.

We first identified an appropriate sample of firms reflecting the above criteria based upon a database containing all incorporated companies in Sweden. Through this search, we sent a mail questionnaire to 1803 firms. We received responses from 403 firms, equivalent to a response rate of 22.4%. Several responding firms did not fit the sampling frame (i.e. inappropriate size, age, industry, etc.) and others returned incomplete responses. This reduced our effective sample to 316 firms. The mean age of the firms was six years and the mean size (based on number of full-time equivalent employees) was 13. 63% of the firms in the sample had fewer than ten full-time employees. The mean of 13 is skewed by the twelve firms with more than 50 employees.

We examined the potential for non-response bias by comparing responding and non-responding firms on the basis of age, industry, size, and financials (sales and profit levels). There were no statistically significant differences. We also compared firms responding after the second reminder
with firms who had responded earlier; the assumption being that late-responders more closely matched non-respondents. Once again, there were no differences based on neither the characteristics of the firms nor in their levels of innovation or knowledge acquisition. Moreover, we called a random sample of 200 non-responding firms in order to ascertain why they did not respond. The most common reason for not responding was a lack of time. This appears like a serious and believable but nonetheless disappointing reason, given that the key informant is the most important executive of a new firm.

Variables and Measures

**Dependent variable.** There is little agreement on suitable measures for innovation (Li & Atuahene-Gima, 2001). In this study, we use a four-item scale to capture Innovative Output. The four items that tap into the self-reported number of radical and incremental innovation pursued. The actual items build upon Cooper (2000), Dewar and Dutton (1986) and Ettlie, Bridges and o’Keefe (1984). All items were measured on a five-point scale ranging from “no new products or services” to “very many new products or services. As this is cross sectional data, we asked the firm to identify its intended behavior over the coming 12 months. We create an index of these four items, and find that the Cronbach’s alpha for this construct is .901.

We invested substantial effort into validating the dependent variable, given the fact that there is little standard basis for measuring innovative output and we ask for intended actions. Firstly, the same question items for the dependent variable were used in a pilot test in a different sample, using multiple respondents from each firm. One of the respondents was the highest executive of the firm, as was the case for this study. There was high agreement in how these two individuals responded to these questions (p > 0.10). Secondly, we examined the relationship between our chosen self-report measures, and other measures of innovation, such as R&D spending, percentage of sales from new products and percentage of sales to new customers, overall sales growth, and different measures of intellectual property. There was a statistically significant correlation between all of these measures. Finally, we sent out a second questionnaire to the same sample one year after the original study (response rate 74%). We asked the same four Innovative Output items but about the actual behavior over the past 12 months. The correlation between the “intended” (i.e. cross-sectional) and “actual” (i.e. one year time lagged) Innovative Output variables was moderately high (.431; p < 0.01). Correcting our scale for measurement error with the Cronbach’s alpha values, as recommended in the literature (Cohen & Cohen, 1983), the correlation between the underlying constructs is 0.591, suggesting high convergent validity. Furthermore, this correlation is substantially greater than the commonly cited correlation between intention and behavior of 0.30 reported in studies of the theory of planned behavior (Armitage & Conner, 2001). We also examined the potential for common method bias using Harmon’s one-factor test (Podsakoff & Organ, 1986). As one single factor did not emerge and one factor did not account for the majority of the variance, common method bias does not appear to pose a grave problem for this study. Taken together, these validations make us comfortable that we have indeed developed a valid measure of Innovative Output.

**Market knowledge acquisition,** which examined the methods used to acquire information about the market, consists of four items and was based on the market orientation literature (cf. Kohli, Jaworski & Kumar 1993). These items have also been used in absorptive capacity studies of knowledge acquisition (e.g. Liao, Welsch & Stoica, 2003). The Cronbach’s alpha for this construct was 0.730.
**Technological knowledge acquisition** measured methods that the firm employed in order to acquire new knowledge about technology. The six items stem from Zahra, Ireland and Hitt’s (2000) study of new venture technological learning. Our items mirrored those used in that study and consisted of 6 items with a Cronbach’s alpha of 0.784.

We measured two aspects of the environment that might be dynamic, market dynamism and technological dynamism. We use these as control variables and then as moderators of the relationship between knowledge acquisition and innovative output. We measured the fluctuating nature of customer demands using two items from Chandler and Hanks (1994). This construct had a Cronbach’s alpha of .839. We used six items from Chandler and Hanks (1994) and Narver, Slater and MacLachlan (2004) to capture Technological Dynamism. The reliability alpha for this construct was .825.

We controlled for two other factors. Firstly, the age of the firm was computed based on founding year. Size was measured based on the number of full-time employees. Both these measures were calculated via self-report data and was confirmed through publicly available data.

**ANALYSES & RESULTS**

We first jointly entered all ten knowledge acquisition items into a principal components analysis. Using Kaiser’s criterion, we extracted two factors with Eigen-values greater than 1. The ten items loaded perfectly on our two knowledge acquisition variables. The distinction between the two modes of knowledge acquisition was further supported in a confirmatory factor analysis. We next examined the correlation matrix among the non-categorical variables. Some of these correlations were high, approaching 0.500. Although these correlations are not critically high (Tabachnick and Fidell, 2000) it prompted us to examine the variance inflation factors (VIF’s). These fall well below the critical value of ten (cf. Hair, Anderson, Tatham, & Black, 1998), suggesting the multicollinearity is not a major issue in this study. Due to space limitations, the results of the principal components analyses, the confirmatory factor analysis, the bivariate correlations and the VIF’s are not reported but are available on request.

We test hypotheses 1-4 using hierarchical linear regression. We first entered the “base model”, consisting of the control variables and the Market and Technological Dynamism variables. These variables explain 6.9% of the variance in innovative output (p < 0.05), as seen in second column of Table 1. Technological Dynamism had a strong positive effect on Innovative Output, whereas no effect was noted of Market Dynamism, Age or Size. We next entered the Market Knowledge Acquisition variable (column 3) and the Technological Knowledge Acquisition variable (column 4), one at a time. Both Market Knowledge Acquisition and Technological Knowledge Acquisition were positively related and explain a statistically significant share of the variance over and above the base model variance (8.9%, p < 0.01 and 17.2% p < 0.01, respectively). This suggests that new knowledge acquisition is important for explaining innovative output in new ventures. This also lends support to H1 and H3 respectively. Finally, we entered the interaction effects of the environment, representing H2a, H2b, H4a and H4b, one at a time. As is common practice, the interaction terms were entered as multiplications of the appropriate acquisition and environment variable (depending on the hypothesis) and were mean centered. We find diverging results for the interactions. The effect of Market Dynamism on the relationship between Market Knowledge Acquisition and Innovative Output (H2a) and the effect of Technological Dynamism on the same relationship (H2b), is negative and statistically significant. There was not a statistically significant effect of external dynamism (both Market and Technological Dynamism) on the relationship between Technological Knowledge Acquisition and Innovative Output. Therefore, H4a and H4b
are not supported.

To determine the nature of the significant interactions, we plotted the effect of Market Knowledge Acquisition on the dependent variable for values of the environment (Market Dynamism and Technological Dynamism) set at the mean and one standard deviation above and below the mean, as suggested by Cohen and Cohen (1983). These plots (not reported here) show the same pattern – at low levels of dynamism, Innovative Output increases with increases in Market Knowledge Acquisition, but at a high levels of dynamism, Innovative Output actually decreases somewhat with increases in Market Knowledge. Thus, the plots provide support for H2a and H2b, respectively.

**DISCUSSION**

In this paper, we hypothesized and found that a stronger emphasis on the acquisition of market knowledge was associated with greater innovative output. We also hypothesized and found that the dynamism of the environment moderated this relationship – the more dynamic and fast changing the environment, the smaller the benefit of acquiring market knowledge. In terms of technological knowledge, we found that firms that acquired more knowledge innovated more and that this applied irrespective of the nature of the environment.

The finding that Technological Knowledge Acquisition was important for innovation is in no way novel. However, the finding that its importance did not vary with the levels of external dynamism is interesting. What this shows is that among new ventures in technology intensive sectors, investing in technology is important regardless of the specific nature of the task environment in which the new venture operates. This may be a reflection of the industries that are under study, where many of the innovations and firms are technology-driven, or that the vast majority of firms attempt to create customer demand or “push” products onto consumers – regardless of the environment. However, the most plausible explanation, give the fact that we study new firms, is that new firms prioritize getting more out of their technological sunk costs. Developing a technological resource base takes time and money, and so new firms may attempt to maximize their ability to base their strategic actions on this resource base by acquiring new auxiliary knowledge that help them hone and maintain their technological knowledge base. There is empirical evidence that the technological knowledge bases of new firms form the basis of all of the future strategic actions and that firms with increased flexibility in using resource bases tend are better able to take advantage of emerging opportunities (Raff, 2000; Kelly & Rice, 2001). It is perhaps the sunk costs involved in building and maintaining a technological resource base that really decide if and what the new firm can do innovatively.

New firms are often credited for being more flexible and innovative than larger, more established firms (Katila & Shane, 2005). One reason for this flexibility is that new firms are not hindered by their commitments to existing technologies or subject to the routines and politics that come about in more established firms. Our preferred interpretation of our findings is that although new ventures may be more flexible than older firms, they still largely rely on their original technological knowledge base and gradually hone it.

Similarly, when examining the direct effect, we found that Market Knowledge Acquisition had a positive influence on Innovative Output. This finding is consistent with the Marketing Orientation and Dynamic Capabilities literatures. However, when we examined the interaction with the dynamism of the task environment, a quite different pattern emerged – in highly dynamic
task environments, investments into Market Knowledge Acquisition was actually associated with lower levels of innovative output.

This finding regarding how environmental dynamism moderates the relationship between market knowledge and innovation is an interesting and important contribution to the literature. To begin with, this provides needed details into the suggestion that firms need to continuously update their knowledge stocks in order to innovate. The implication of this finding is that new firms do not need to acquire large amounts of market knowledge in fast changing markets in order to innovate and that the greatest benefits of customer knowledge come in less dynamic environments. There are a number of potential explanations for this finding. The first is that, in fast-changing environments, customers lack foresight and therefore may not be able to accurately describe what their needs are going to be in the future (Hamel & Prahalad, 1994). Customers frequently do not comprehend the practical applications of new technologies or what new technologies are emerging. They therefore have a hard time in foreseeing potential solutions to problems or how alternate solutions, based on novel technologies, may create more value for them. In their study of the disk-drive industry, Christensen and Bower (1996) noted that the leading firms may lose their market positions by listening too carefully to customer demands. They argue that customers are not able to see any new important developments in the future and therefore may not be able to articulate their needs or take into consideration alternative uses of technology to satisfy their needs. In more predictable environments, customers may be able to better articulate their expected future needs and what technologies will most effectively be able to solve these.

A second explanation of why market knowledge loses its effectiveness in more dynamic markets involves the factor of time. As producing a new innovation takes time, the time lag between acquiring knowledge about a new customer need and actually being able to produce a solution that satisfies that need may hinder firms from immediate responsiveness. However, in rather stable, predictable environments, the time lag becomes less of a burden as customer needs remain somewhat constant over time. As such, in stable environments, firms actively engaging in high levels of knowledge acquisition also have the time to produce a solution that responds to this need.

For new firms, the potential losses of a misplaced innovation may have dire consequences. New firms tend to be generally resource strapped and the acquisition of new knowledge requires the use of resources that could potentially be put to other uses. Both organizational failure and growth are related to innovation (Barnett & Freeman, 2001; Brüderl & Preisendorfer, 2000), showing that innovation is a risky endeavor. New firms may therefore try to reduce the risk of innovating by limiting their investments into the acquisition of new market knowledge in dynamic task environments. This means that new firms want to avoid taking major risks in markets where there is less certainty in succeeding, or also the realization that firms cannot survive in the long-term by delivering to extremely finicky and temperamental customers. In a recent study, McKelvie and colleagues (2008) find that new firms in the software industry tend to avoid launching products when external uncertainty is high.

Regardless of the explanation of why market modes of knowledge acquisition are less fruitful in more dynamic markets, our finding clearly breaks away from the extant market orientation literature. Within this literature, the common argument is that firms should actually increase their dependence on market knowledge acquisition (Kohli & Jaworski, 1990; p. 14). Furthermore, it also challenges the commonly-held assumption in the dynamic capabilities literature that the majority of new technology firms focus on market, not technological knowledge in fast-changing markets (Berry & Taggart, 1998). Future studies need to take into account that new ventures have
limited resource pools and that they need to use these resources effectively in order to innovate and prosper. Given limited resources, new ventures need to prioritize their focus and investments. Investments into the acquisition of market knowledge appears to be associated with trade-offs that are worthy of further examination.

In sum, our results show that both the market and the technological modes of knowledge are appropriate lenses to understand innovation. While we hypothesized these relationships, the limited explanation power of the models (16 and 24% respectively) shows that there are further important factors to take into consideration than simply knowledge acquisition. The contention of this paper is not to fully explain how and why new firms are able to innovate, but rather that knowledge acquisition is an important first step for new firms in innovating. Further research into what firms do with this knowledge upon acquisition, such as studies examining the differing processes of absorptive capacity (e.g. Liao, Welsch & Stoica, 2003; McKelvie, Wiklund & Short, 2007) are beneficial. Moreover, understanding the goals and strategies of the firm, including evaluating the importance of a growth orientation and high-risk strategies, would be helpful in understanding the reasons why some new firms choose to innovate more than others.

There are two obvious implications for entrepreneurs of our findings. The first is that for innovation to take place, it makes sense to invest resources into the acquisition of new knowledge. Second, learning more about technology is generally positive for new ventures in the industries that we studied. In terms of market knowledge, however, entrepreneurs benefit from first assessing the rate of change in their environment. Is it easy or difficult to foresee what new technology competitors will develop? Are the projections and viewpoints of customers reliable or do they tend to change their minds? Do they even know what they want and need? If the environment is dynamic, it appears wise to save the money and effort associated with finding out about the market and instead invest them into technological advancement.

Like all research, this study has a number of limitations. To begin with, it is based on cross-sectional data acquired from a single respondent. Problems associated with these, such as common method bias, establishing the cause-and-effect nature of knowledge acquisition on innovation, and the reliability of the key variables, are difficult to entirely discount, despite our efforts to overcome them. Fully longitudinal studies, using multiple sources of data, are the natural next step. In addition, the fact that we studied new and generally small firms may not be generalizable to older or larger firms. Indeed, our sample included a majority of firms with fewer than ten employees. Larger firms, with more established routines and more developed resources that can withstand negative consequences of a failed innovation, may lead to different results concerning the role of knowledge on innovation. Finally, we have not examined the role of knowledge acquisition on performance. The dependent variable in this study is innovation, not the subsequent market performance or acceptance rates of released innovations. This is an important caveat as the effectiveness of knowledge on innovation in differing environments may be different from the role of knowledge on the performance of the innovations or on the firm. We did find a correlation between innovation and subsequent sales growth in our sample, however.

CONCLUSIONS

This paper contributes to the innovation literature by showing how the knowledge acquisition of new ventures contributes to their innovative output. Consistent with the literature, we find that the acquisition of new technological knowledge is positively associated with greater innovative output. This applies irrespectively of the nature of the task environment in which the new venture operates. We also find that the more dynamic the environment, the less important is the acquisition
of market knowledge in determining innovative output. While this finding can be interpreted and explained on the basis of early research on strategy and environment, it runs counter to what has been assumed by the market orientation and dynamic capabilities literatures. As such, this finding provides important evidence to help guide the actions of practitioners – of course, knowledge is a good thing, but given the limited resources of new ventures, it appears to make more sense to acquire knowledge in certain areas than in others, depending on the characteristics of the task environment. For researchers, this study provides some important boundary conditions for the applicability of a market knowledge approach to innovation. It also provides future opportunities and challenges for researchers. It appears that the relationship between knowledge and innovation is more complex than assumed.

CONTACT: Alexander McKelvie; mckelvie@syr.edu; (T): 315-443-7252; Whitman School of Management, Syracuse University, 721 University Ave, Syracuse NY, 13244.

NOTES

1. The consistency among different measures is typically tested using correlation coefficients (Loo, 2002), but it is difficult to specify a single threshold upon which two measures can be considered to support concurrent validity. For correlation coefficients in general, Cohen (1988) argues that 0.1 is a small correlation, 0.3 a moderate and 0.5 a large correlation. Based on this, we consider correlations between 0.3 and 0.49 to reflect moderate concurrent validity and correlations of 0.50 and above to reflect high concurrent validity.

REFERENCES


Table 1: Results of the effects on innovative output

<table>
<thead>
<tr>
<th></th>
<th>Base model</th>
<th>Market Acq</th>
<th>Tech Acq</th>
<th>Int1</th>
<th>Int2</th>
<th>Int3</th>
<th>Int4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-.047</td>
<td>-.025</td>
<td>-.042</td>
<td>-.026</td>
<td>-.025</td>
<td>-.042</td>
<td>-.042</td>
</tr>
<tr>
<td>Size</td>
<td>.102</td>
<td>.078</td>
<td>.011</td>
<td>.075</td>
<td>.068</td>
<td>.011</td>
<td>.013</td>
</tr>
<tr>
<td>Market dynamism</td>
<td>.019</td>
<td>.027</td>
<td>.018</td>
<td>.024</td>
<td>.028</td>
<td>.018</td>
<td>.017</td>
</tr>
<tr>
<td>Technological dynamism</td>
<td>.248***</td>
<td>.209***</td>
<td>.138</td>
<td>.214***</td>
<td>.191**</td>
<td>.138*</td>
<td>.142*</td>
</tr>
<tr>
<td>Market acquisition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tech acquisition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market acquis. X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market dynamism</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market acquis. X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tech dynamism</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market acquis. X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tech dissemination</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R2</td>
<td>.069**</td>
<td>.158***</td>
<td>.240***</td>
<td>.167*</td>
<td>.170*</td>
<td>.240</td>
<td>.240</td>
</tr>
<tr>
<td>Adj. R2</td>
<td>.053**</td>
<td>.141***</td>
<td>.225***</td>
<td>.147*</td>
<td>.150*</td>
<td>.222</td>
<td>.223</td>
</tr>
<tr>
<td>R2 change</td>
<td>.089***</td>
<td>.172***</td>
<td>.009*</td>
<td>.012*</td>
<td>.000</td>
<td>.000</td>
<td></td>
</tr>
</tbody>
</table>

*** = p<.001; ** = p<.01; * = p<.05; standardized coefficients displayed