

SOURCES OF INITIAL RESOURCE POSITIONS IN NEW VENTURES

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A considerable amount of research in the field of entrepreneurship has begun to draw upon resource-based theory to better understand the evolution of new ventures and the factors that contribute to their performance. One issue that has not been explored is how new ventures move from a position of virtually zero resources at their inception to the possession of a compelling, sustainable and economically attractive resource position. In this study we develop a rationale that the foundation for sustainable new ventures is a knowledge-based resource position. Using a sample of technology-based firms we empirically examine the relative importance of knowledge resources, as well as the role of prior industry and startup experience and the impact of social networks as antecedents contributing to initial knowledge resource positions.

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INTRODUCTION

Resource-based theory (RBT) is being increasingly used by entrepreneurship researchers as an informative theoretical framework for the exploration and understanding of many dimensions of entrepreneurship. Alvarez and Barney (2004) employ concepts from RBT to describe why entrepreneurial firms may be viewed as governance mechanisms that serve to appropriate rents. Various studies examine the effects on new venture performance of different types of resources developed by new ventures, including financial, social, technological, physical and human resources (e.g. Brush, Greene, & Hart, 2001; Greene & Brown, 1997; Lichtenstein & Brush, 2001). RBT has also been applied at the micro level to better appreciate the cognitive abilities of individual entrepreneurs (Alvarez & Busenitz, 2001) as well as at the macro level to provide guidance for entrepreneurial economic community development (West & Bamford, 2005).

The bulk of the entrepreneurship research that relies on RBT presumes the existence of resources or evaluates new ventures that have already developed resource positions. In contrast, the focus of this paper is on the initial resource development challenge that confronts every new venture. At its inception a new venture by definition possesses no RBT resources (e.g. valuable, rare, inimitable, non-substitutable, and non-tradeable, Barney, 1991). How does the new venture move from an apparent position of zero resources to the possession of competitively-insulating resources? This question has been partially explored in the context of only two isolated cases (Brush et al., 2001), but has not been systematically addressed. Thus in this study we explore

what types of resource positions are first developed in new ventures, and what contributes to their development. We build the argument that knowledge resources are the key foundational resources for new ventures, suggesting that knowledge resources allow the new venture to respond effectively to the unique strategic challenges that they confront at startup. Analysis of data collected from young firms in the information, biotechnology, and medical technology arenas provides insight into the relative importance of knowledge resources as well as the factors that contribute to their development.

The findings of this study enhance our understanding of how *sustainable* new ventures get started. We collectively understand much about starting up in general, but starting up new ventures with a foundation leading to sustainability and long-term success is a more refined case. Entrepreneurship research in general and resource-based theory in particular point to a path dependency and the development of resource positions as a crucial sustainability issue (Bamford, Dean, & Douglas, 2004; Hansen, 1995; Romanelli, 1989). The resource-based view provides a theoretical foundation for this argument and method and thus offers a useful perspective on this important process.

RESOURCE BASED THEORY AND NEW VENTURES

Resource-based theory is a valuable perspective for understanding the process and pace of new venture development. The resource based view provides a strong foundation for how initial organizing activities impact the long term success of new ventures. Delmar and Shane (2004) argue that efforts by new ventures to establish legitimacy will impact both short term survival and long term success. This is because legitimacy, when properly established, helps

avoid early disbanding and also provides a foundation upon which to transact and build future competitive advantage. While these authors focus on activities that develop perceived legitimacy (Aldrich & Fiol, 1993), such as establishing a legal organization and completing a business plan, a focus on resource development instead provides a substantive foundation conferring meaning and force to any such organizing activities. There are two facets of the theory that support this argument and are particularly appropriate for its application to new ventures in this discussion. First is its focus on generating sustainable competitive advantage and second is its recent focus on the dynamic process of creating resources in entrepreneurial situations.

The resource-based view of the firm attempts to define fundamental factors within organizations that create competitive advantage (Barney, 1986; Dierickx & Cool, 1989; Penrose, 1959; Wernerfelt, 1984). Critical to the theory is the assumption that resources are fundamentally heterogeneous among firms (Penrose, 1959; Peteraf, 1993). Wernerfelt (1984) describes resource strengths tied semi-permanently to firms and equates sustainable advantage with resource position barriers analogous to mobility barriers (Caves & Porter, 1977). Barney (1986), Dierickx and Cool (1989), and Lippman and Rumelt (1982) also describe how the causal ambiguity of resources makes it difficult for competitors to imitate or reproduce them. Together, these conditions create *ex ante* and *ex post* limits to competition (Peteraf, 1993). The creation of heterogeneous resources that are valuable, imperfectly mobile, inimitable, and non-substitutable (Alvarez & Busenitz, 2001; Peteraf, 1993) can enable new firms to lay a foundation allowing them to compete effectively on a sustaining basis (Alvarez & Barney, 2004).

Attention to sustainability is the fundamental reason for invoking RBT as an explanatory mechanism in new venture development. This connection is not without controversy. Seminal

resource theorists have argued that RBT is not entirely applicable to new ventures. Penrose (1959) held that larger firm size and resource stocks provided a greater range of opportunities to pursue, whereas small size and limited resource stocks severely restrict managerial choice and thus relegate small firm performance more to market conditions. This "small business concern" is echoed by Wernerfelt, who claims that "the model places considerable weight on initial resource stocks...[in which] a related problem...is that the resource-based approach has relatively little to say about entrepreneurial firms" (1995: 135). However, we would argue that successful new ventures are those which, in fact, are able to create value while at the same time insulating themselves from competition. Without the benefits that accrue from valuable assets that are rare, inimitable, non-tradable and non-substitutable, anything that a new venture might do could be competed away by competitors both large and small. Thus if sustainability of its competitive position is of concern to the entrepreneur and the new venture investors, it must prompt the new venture to consider resource development at its very inception. [note: need "imprinting" argument here as support]

Second, a dimension of resource based theory that is receiving increasing attention is the dynamic development of resource positions over time. As competition and contexts evolve, firms must consider the development of new or enhanced resource positions. This has led to the development of the dynamic capabilities argument (Teece, Pisano, & Shuen, 1997), and to the exploration of investments in either complementary or secondary resource positions by firms (Peteraf, 1993; West & DeCastro, 2001). Few new ventures could spring into action with a fully developed set of resources of all varieties (financial, human, organizational, technological, etc.). As described at the outset, new ventures by definition come into being at first as only the crystallization of an idea about a potential market opportunity, and they generally possess no

resources of the type described in the RBT literature (Greene, Brush, & Hart, 1999). New ventures at their inception have not had the chance to accumulate slack (Bourgeois, 1985) allowing them to invest in a broad set of resources. Thus a key challenge as a new venture grows is the parallel development of a broad set of resources. Moreover since new ventures confront a continuously shifting landscape of life cycle problems (Kazanjian, 1988) as well as an evolving competition and strategy (Dess, Lumpkin, & Covin, 1997), they need to continuously adapt their resource positions in order to meet the evolving strategic challenges (Greene et al., 1999; West & Bamford, 2005). This discussion suggests that sustainable new ventures are likely to follow a path of resource development, starting with nothing and somehow progressing over time to a broad set. We now turn to the initial resource development challenge.

FOUNDATIONAL RESOURCE DEVELOPMENT

Many categories of resources have been identified in RBT research. The first published paper on entrepreneurship that identifies a variety of resources in the context of RBT (Greene & Brown, 1997) mentions five types of resources. These include human, social, physical, organizational, and financial resources. These authors go on to categorize new ventures along the dimensions of innovation rate and growth rate based upon the resource needs of each venture. For example, "economic core" ventures such as corner stores and small professional service firms would have low needs for physical, financial, and organizational resources, while "ambitious" and "glamorous" new ventures have high needs for these types of resources because they seek higher innovation and growth rates (Greene & Brown, 1997).

Three additional types of resources have been identified in subsequent research. Recognizing that science- and technology-based new ventures constitute an important dimension of local and national economic development efforts (Venkataraman, 2004), technological resources that encompass intellectual property rights have become more prevalent in RBT lexicon as it relates to entrepreneurship. Intellectual property resources, which enable these types of firms to appropriate rents (Alvarez & Barney, 2004), were identified explicitly in a recent examination of the resources used in the startups of both Palm Computing and Handspring (Brush et al., 2001).

More generally, knowledge based resources have been identified as a critical type of resource for new ventures. Knowledge resources of new ventures, which are both complex and involve multiple people/systems, characterize what is known as innovative entrepreneurship (Zander & Kogut, 1995). Knowledge resources encompass "know-how" and know-what" (Malecki, 1997; Wiklund & Shepherd, 2003) about markets and customers, innovation capabilities (Ranft & Lord, 2000), and dimensions of starting up new ventures (Wright, Robbie, & Ennew, 1997a). Since knowledge is often tacit and idiosyncratic to the new venture, it exhibits the character of resources described originally by Barney (1991).

The largest amount of published research appears to be focused on the impact of social resources – specifically the influences and impact of networking – on new venture performance. Dimensions of network size and activity are positively related to growth in employee payroll (Hansen, 1995) and enhanced innovation management performance (Rodan & Galunic, 2004). In UK medical equipment new ventures researchers found that the use of network resources enhances learning within the firm (Shaw, 1993), and strong ties in network resources within small firms were found to enhance employment growth, sales growth and survival (Bruderl &

Preisendorfer, 1998). In a study of 159 owner-manager small firms Ostgaard and Birley (1996) found that network resources can be used to develop additional resources in new ventures, an argument supported in other qualitative studies of three Netherlands technology firms (Elfring & Hulsink, 2003) and two US technology ventures (Brush et al., 2001).

Dynamic Resource Development

The studies cited above have all examined discrete resource positions of new ventures at discrete stages in the venture's development. Only a few studies have considered resource development in new ventures from a dynamic, evolutionary point of view. The study by Greene and Brown (1997), mentioned earlier, offers twenty propositions regarding combinations of resources required by firms in discrete quadrants of an innovation/growth matrix. However this matrix is used to describe the heterogeneous population of small firms (Greene & Brown, 1997), and does not provide a roadmap for an individual new venture to follow in its development.

Two other studies have examined dynamic resource development. Lichtenstein and Brush (2001) tracked the resource development process in three small companies longitudinally over a twelve month period. Their research identified the typology of resources described above, confirming the validity of previous work in classifying resources. In addition they found that certain resources and bundles of resources appeared to be more salient at different stages of firm development and that these resource bundles change over time in response to changing conditions confronted by the firm. The type of change in resource positions fundamentally associated with both survival and growth in these firms not only included incremental alterations in existing resources, but also the evolution of resource bundles into new combinations.

Thus we find that entrepreneurship research has frequently invoked RBT and acknowledges the fundamental dynamic resource development arguments as central to new venture evolution. However, research has not carefully explored the critical question about the derivation of resources at the very beginning of the new firm. For example, Lichtenstein & Brush (2001) examined the growth and development of resources bundles in new ventures over time stating that resources must be identified and acquired, but their test cases were firms that enjoyed established resource positions at the outset of the study. An earlier study proposed that the use of networks leads to the development of idiosyncratic resource positions but then goes on to test the relationship between network use and new venture performance (Ostgaard & Birley, 1996), eliminating initial resource positions as an intervening variable. The focus of research in entrepreneurship resource positions, in fact, has traditionally not been on the creation/development of resources but has been an examination of their impact on new venture performance (e.g. Chrisman & McMullen, 2004; Wiklund & Shepherd, 2003).

And so we remain with the pivotal question posed at the outset of this paper: how does a new venture move from a position of zero resources to the possession of a competitively-insulating bundle of resources? We now build the rationale that the foundational resource position for any sustainable new venture is knowledge-based.

Primacy of Knowledge Resource Positions

A view finding currency in RBT is that a firm's resource-based advantage arises from dimensions related to managerial knowledge. Penrose (1959) explicitly mentions entrepreneurial capabilities of management as key to understanding how the firm attains growth and a

competitive position. Management must identify and evaluate resources (Barney, 1991) as well as exercise discretion over which resources to utilize and how to utilize them (Castanias & Helfat, 1991). Competitive advantage arises to the extent that managers create higher order organizing principles (Kogut & Zander, 1992) for the assembly and integration of underlying resources. Thus intangibly defined resource strengths such as human capital (Amit & Schoemaker, 1993), routines and knowledge (Grant, 1996) have been linked to enhanced firm performance. In the area of entrepreneurship Cooper, Gimeno-Gascon and Woo (1994) similarly link resource profiles of entrepreneurial firms, which include human capital and relevant knowledge, to new venture survival or failure.

The various terms used to describe this more current view of resources – managerial capabilities, organizing principles, human capital, routines – all fundamentally refer to types of knowledge about the management of new ventures. For example, in studying acquisitions of technology firms Ranft and Lord (2000) find that the human capital retained by acquiring firms represents a potent source of knowledge transfer that favors the achievement of planned synergies. They also describe employee skills, managerial systems and processes as socially complex knowledge-based capabilities. As mentioned earlier, the complexity and tacitness of knowledge has also been said to characterize innovative entrepreneurship (Zander & Kogut, 1995).

Reflecting this recent interest in knowledge resources, a small number of studies have examined the impact of knowledge resources on new venture performance. Prior knowledge appears to enhance opportunity identification or discovery (Elfring & Hulsink, 2003; Shane, 2000), while knowledge accumulated within the new venture is found to enhance performance (Wiklund & Shepherd, 2003) and survival (Chrisman & McMullen, 2004). Knowledge

resources of new ventures appear to be important in the acquisition of new ventures (Ranft & Lord, 2000) as well as in the spinoff of businesses into new ventures (Sapienza, Parhankangus, & Autio, 2004).

Brush et al. (2001) examined how both Palm Computing and Handspring developed from inception to legitimate businesses by reconstructing the path of resource development in each firm. In each case the complex knowledge resources possessed by founders Jeff Hawkins and Donna Dubinski were instrumental in their acquisition or exchange for utilitarian resources (such as financial and physical capital) that enabled their new ventures to start up operations. Important insights drawn from this study include the primary importance of knowledge resources at the startup stage, as well as the idea that these knowledge resources may be used instrumentally to acquire or develop other more tangible resources.

We suggest that knowledge resources represent the fundamental basis for success in new ventures. At the outset an entrepreneur possesses virtually no resources that can be claimed by a new venture; the founder has only his or her ideas about a possible opportunity that could lead to the founding of a new venture. Lending Tree.com was founded by Doug Lebda as a solution to his frustration with the process of getting a mortgage loan. He had no experience in either internet applications or banking, but he had well developed concept, the ability to attract talented people as well as to present a vision for a new business. Through a variety of information processing activities the entrepreneur develops refined asymmetric knowledge about the opportunity's real potential, then selectively "brokers" such idiosyncratic knowledge (West, 2003) in exchanges to acquire additional resources of value, such as the provision of financial resources and relationships with key suppliers or customers. Building knowledge resources presents a foundation to begin establishing legitimacy and credibility for the new venture (Katz

& Gartner, 1988). In turn the new venture's knowledge resources can then be used instrumentally in exchange for other necessary utilitarian resources.

Hypothesis 1: Knowledge resource positions are more prevalent than other types of resources in early stage new ventures.

It is often assumed implicitly that the kinds of knowledge important to new venture success are industry-specific. However this may be too restrictive a view of the kinds of knowledge that enhance venture performance. New venture performance also requires more broadly applicable knowledge about organizing, planning, and motivating. Successful new venture development may be enhanced by knowledge gained through previous experience in new ventures (e.g. Westhead, Ucbasaran, & Wright, 2005; Wright, Robbie, & Ennew, 1997b). The previous experience of both Hawkins and Dubinski enabled them to more easily navigate startup resource acquisition issues at Handspring, such as selecting venture capitalists and raising financial capital. Their management experience also enabled them to more easily set up sophisticated supply chain relations and internal customer service operations (Brush et al., 2001).

Building on these ideas, three types of knowledge are considered to be important for new ventures. In the most straightforward case, employees of existing companies may decide to become entrepreneurs, venturing out on their own to create companies that build usefully upon the content-specific knowledge they have acquired related to their industry, company, or position. In fact, Chandler (1996) found some evidence of this as it relates to task environment and job skill. In this case the type of knowledge that is required for the new venture is highly related to the previous experience of the entrepreneur, the venture should have a higher probability of success. On the other hand, where an entrepreneur brings content knowledge to a new venture that is unrelated to that necessary for the venture, there should be a higher risk of

failure. This is the type of entrepreneurship most often associated with pattern recognition, where "experts" in specific areas are able to more adeptly identify core issues and areas for improvement.

These ideas lead to hypotheses about the contributions of previous experience to the development of knowledge resources in the new venture. In forming these hypotheses, however, we want to be careful to distinguish the different kinds of experiences brought to the venture by the leader of the venture and by the members of the venture's top management team. In discussing differences between individual entrepreneurs and corporate venture champions Greene et al. argue that such leaders have "an influence on the start-up process that is instrumentally different from other members of the organization" (1999: 111), a factor borne out in other studies examining the unique contributions of CEOs in new ventures (Bruton, Fried, & Hisrich, 1997; West & Meyer, 1998). On the other hand a significant body of work has also examined the unique contributions made by top management teams to new venture development and performance (e.g. Lumpkin & Dess, 1996; Shepherd & Krueger, 2002).

Hypothesis 2a: A new venture's knowledge resource position is positively correlated with the relatedness of the industry, business, and role in the new venture to the previous work experience of the new venture's CEO .

Hypothesis 2b: A new venture's knowledge resource position is positively correlated with the relatedness of the industry, business, and roles in the new venture to the previous work experiences of the new venture's top managers .

Another example of knowledge transfer is the case of someone who has already been an entrepreneur creating, building, and harvesting businesses, and who now sets out to start another business. In this case it is reasonable to think that knowledge about the challenges and management issues that are peculiar to startups would be specifically useful and applicable in the

new venture setting. Previous research on this question has been equivocal. Wright et al. (1997b) found that the assets of entrepreneurs exceeded their liabilities in serial startup activity, but that their performance was no better than novice entrepreneurs. However other studies have pointed out the benefits of previous startup experience (Cowe, 1998; Wright et al., 1997a). The entrepreneur or CEO who has previous startup experience would appear to better understand the steps to take in order to maximize the new venture's potential. He or she would also understand what pitfalls may lie ahead and thus what steps not to take (e.g. Brush et al., 2001). This may include awareness and anticipation of significant strategic and organizational problems associated with the staged growth of new ventures (e.g. Kazanjian, 1988), as well as more pragmatic issues such as negotiating space leases with realtors or lines of credits with banks.

Hypothesis 3a: A new venture's knowledge resource position is positively correlated with the previous startup experience of the new venture's CEO.

Hypothesis 3b: A new venture's knowledge resource position is positively correlated with the previous startup experience of the new venture's top managers.

Finally, entrepreneurs may supplement any industry, business, or previous startup knowledge they possess with additional knowledge gained through networking (e.g. Aldrich & Zimmer, 1986; Birley, 1985; Dubini & Aldrich, 1991; Johannisson, 2000). Network theory places particular importance on the connections between different social groups as particularly salient in the diffusion of new information (Granovetter, 1973; Rogers, 1983; Rogers & Kincaid, 1981). Reflecting this view, the information benefits to individuals who bridge "structural holes" between different network clusters (i.e. who have strong relations with other network clusters possessing very different information) are especially valuable (Burt, 1997; Rogers & Kincaid, 1981). Thus information networks are most valuable when they provide access to individuals

who possess relevant knowledge that the entrepreneurs cannot gain through their own experience or regular contacts. By bridging "structural holes" and communicating with members of other groups, new and more valuable information is provided to entrepreneurs and this information may assist them in their efforts to start and grow the company.

Behavior within entrepreneurial networks may also affect the extent to which new opportunities are successfully pursued by entrepreneurs. Much has been written about entrepreneurial alertness (Kirzner, 1979) leading to opportunity recognition (de Koning, 1999; Singh, Hills, Lumpkin, & Hynels, 1999). Individuals who are more comfortable in and have a propensity for bridging structural holes in networks may be more successful at generating flows of unique information through their efforts. Such individuals may then be more successful in attracting human and capital resources for their firm startup by first developing unique information and knowledge and then successfully brokering it to appropriate parties (Hilmy, 1992). Therefore, critical networking dimensions important to building knowledge about new entrepreneurial opportunities include both flows of new information and continuous networking activity.

Hypothesis 4: A new venture's knowledge resource position is positively correlated with the networking behavior by the new venture's CEO that generates new information on an ongoing basis.

METHODOLOGY

This study was conducted among CEOs of new ventures in a medium-sized midsouth city. Surveys were sent to 200 startup firms that were identified through the local chamber of commerce, local entrepreneurship networking organizations, and Dun & Bradstreet as being in

information technology, biotechnology, and medical or pharmaceutical technology areas. 95 firms responded, for a 48 percent response rate. On average the responding firms were 6 years old and had 33 employees. Life cycle stage data collected from the respondents reflects the early development of these technology companies; on average the firms are between the commercialization and growth stages in their development.

Resource positions. Measures of resource positions are developed inductively using quantitative factor analysis of CEOs' ratings of a series of survey items. A literature review of RBT studies identified both conceptual categories of resources (as described above) as well as specific items that describe types of resources (e.g. Brush et al., 2001; Greene, Brush, & Brown, 1997; Ranft & Lord, 2000; Zander & Kogut, 1995). This resulted in a list of 28 items that related to 7 conceptual categories of resources (see Appendix A). Each item was represented by a statement, such as "We spent a long time learning how to start and grow a business." CEOs were asked to respond to each statement on a 7-point Likert scale, with anchors "very strongly disagree" to "very strongly agree."

Resource positions were identified through factor analysis of the ratings by respondents to the items. Factor analysis requires a ratio of roughly 5 cases per item (Tabachnik & Fidell, 1989), which was not available here based upon responses received. Therefore, an iterative approach was used, running a series of exploratory principal components analyses to identify the survey items that would be included in the final factor analysis. We ran a series of principal components analyses substituting individual items and blocks of items (Appendix A) in order to identify a subset of items that would best explained observed variance across the data. The criteria for removing items included low communalities, loading poorly (< 0.30) on any factor with an eigenvalue greater than 1.0, and/or loading across three or more factors. This process

resulted in a subset of between 13-17 items for use in the final analysis, and meets the variables-to-cases ratio criteria for factor analyses that are not unstable or overfitted. Principal components analysis was then run, followed by principal axis factors analyses that varied the initial criteria factors seed and the rotation method. Each of these trial runs produced a 5-6 factor solution. Because there were non-significant correlations among identified factors, the resulting matrix was rotated orthogonally for interpretation.

Experience relatedness. CEO respondents were asked to rate how related their present circumstances were to that of the previous company where both they and each of their top managers worked. Three dimensions of relatedness were sought. *Industry relatedness* represents the extent to which the present company operates in the same or very similar industry; *business relatedness* represents the extent to which the present company's products, services, or overall approach (e.g. strategy, R&D effort, operations, marketing, sales, etc.) are the same or very similar; and *position relatedness* represents the extent to which the day-to-day activities and functional skills are the same or very similar. Respondents evaluated each relatedness dimension using a five-point scale, where 1 was "extremely unrelated" and 5 was "extremely related."

Previous startup experience. CEO respondents were asked if they had founded or worked in other startup companies previously. Response options ranged from "zero" to "3 or more." CEOs also indicated whether each of their top managers had worked in a startup in their previous employment.

Networking. CEO respondents were asked to identify each individual outside the company "who provided especially important information or advice" about starting up or operating the company. The respondent was asked to rate the communication frequency with each individual named in this self-generated roster, and the "newness" of information provided

by each person named. A five-point rating scale was used for each dimension. For communication frequency the scale ranged from 1 for "very infrequent" to 5 for "very frequent;" for newness of information and advice the scale ranged from 1 for "not at all" to 5 for "to a very great extent." *Network intensity* represents a multiplicative interaction (Cohen, 1978) between these two item responses.

Size of firm. Performance, life cycle stage, networking intensity, and resource development are often related to firm size. Therefore a measure of firm size was used as a control variable. Firm size was proxied using number of employees, log-transformed to a normal distribution.

RESULTS

The results of the factor analysis appear in Table 1 (loadings < 0.30 suppressed). The goal of the analysis was to achieve a balance between maximizing the percent of explained variance, minimizing differences in the reproduced correlation matrix based on factors identified, and maximizing simple structure and the interpretation of the factors (Thurstone, 19xx). Five factors were identified, explaining 58% of the observed variance. Based on the item loadings the factors were interpreted and named with two of the factors interpreted as relating to forms of knowledge: Startup Knowledge (factor 1), and Knowledge about Business Complexity (factor3). This provides strong support for Hypothesis 1.

Please insert Table 1 about here

Table 2 provides descriptive statistics and correlations of the variables used in this study.

Need to add some discussion in here.....

Please insert Table 2 about here

Factor scores for the knowledge factors were used as dependent variables in regression analyses to test the other hypotheses. A summary of the regressions appears in Table 3. Models 1-4 regress knowledge factor scores separately on measures of CEO and top manager experience relatedness. CEO experience relatedness is significantly correlated with startup knowledge resources ($F = 5.071, p < .001$), but not with complexity knowledge resources. In contrast, top managers' experience relatedness is strongly correlated with complexity knowledge resources ($F = 3.803, p < .01$), but not with startup knowledge resources. These results provide partial support for both Hypotheses 2a and 2b.

Please insert Table 3 about here

Models 5-6 (Hypothesis 3) regress knowledge factor scores on previous startup experience. Neither startup experience of the CEOs or their top managers is related to knowledge resources. Hypotheses 3a and 3b are not supported.

Models 7-8 regresses knowledge resources on CEO networking intensity. CEO networking intensity is significantly related to startup knowledge resources ($F = 5.011, p < .01$), but not to complexity knowledge resources. Hypothesis 4 therefore receives partial support.

Note: Chuck, I've hardly had time to get back into this data. There is something squirrely in terms of why we're getting standardized betas of +1. I tried a couple "quick & dirty" ANOVAs by dichotomizing the "network intensity" variable, but nothing seemed to fall out of this. Kelly

had suggested earlier we might try trichotomizing it. I'll need to examine this more carefully when we return. The whole thing doesn't make much sense, would be much cleaner if we could just stay with linear regression throughout all the testing.

DISCUSSION

Need to add significantly to this discussion & implications section....

We began this research study as an exploratory examination of the presence and relative importance of types of resources at the founding of a new venture. New ventures begin their existence with virtually no tangible resources, no procedures and no market legitimacy. Every resource must be developed in order for the new firm to appropriate sufficient rents to become viable. RBT has done an admirable job of identifying principles underlying sustained competitive advantage, but has not addressed the issue of initial resource development.

Entrepreneurship research increasingly draws on RBT, and has also not systematically studied the development of initial resource positions. We developed a rationale that both the resource based theory of the firm, entrepreneurship research and the reality of entrepreneurial startups suggest a privileged role for knowledge resources in early stage new ventures. Knowledge presents a foundation upon which additional resources, and thus sustainability, may be built.

Using a survey of high-technology firms we find that knowledge resources were very important in the early stage of the new ventures. Knowledge resources were two of the five resource factors identified, and explained 26% of the variance observed in the variable loadings. That knowledge provided by the CEO and the rest of the top management team constitutes a primary resource for new ventures provides valuable insight into the startup process in specific

terms, and points toward the need for greater understanding of cognition, learning, and other knowledge-development practices.

The results of this study provided a new empirical view of the resource development process, and a more disaggregated view than prior studies provides. Here we find that there are two types of knowledge resources important in early stage technology ventures, and that there are different antecedents to each. Startup knowledge is highly associated with the CEO's previous experience, especially previous experience as a CEO, and the intensity of the CEO's networking behavior. On the other hand, the breadth of knowledge in the new venture (particularly knowledge of the complexity of the business) springs from the rest of the top management team. Interestingly, we found that top managers' industry relatedness was strongly positive while business relatedness was strongly negative. This suggests to us a confirmation of prior research regarding broad industry understanding as being a contributor to new venture development. It also suggests to us that new firms may find the specific business relatedness of top management team members limits their adaptability to the needs of the present venture. A new venture needs top managers who understand the industry in which it competes. But because the venture seeks to do something new in the industry, importing recipes from other related businesses (Spender, 1989) may simply replicate what is already being done and actually diminish the value of knowledge resources to the new venture.

When we consider founder knowledge generally as the critical resource-based advantage of new ventures and our specific findings of: 1) prior startup experience; 2) knowledge about the depth and complexity of the business; and 3) network intensity as the preeminent resource-based advantages to any new venture, we have a foundation that has important implications for both practice and research. From a research perspective, an in-depth examination of the skills,

abilities, background experiences, network connections and market understanding would appear to be areas ripe for future research. These “hidden” assets provide a grounded foundation within the context of the RBT, potentially providing new ventures with the ability to appropriate economic rents. The ability of investors and entrepreneurs to put together the most successful combinations of knowledge resources may provide benefits far beyond the extraordinary efforts made today to develop tangible resources positions.

Table 1: Descriptive Statistics

To be added

Table 2: Factor Solution

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Eigenvalue	2.816	1.985	1.379	1.121	1.031
Factor Intrepretation:	Knowledge about starting up	Mngt. and Financial Knowledge	Knowledge of complexity	Community Support	Formal networks
Item Description					
Spend time learning to start / grow (RC)	0.714				
Challenge - complexity starting & growing (RC)	0.561		0.454		
Local contacts & community assisted greatly	-0.534			0.473	
TMT strong & complete		0.724			0.328
Have necessary financial resources & contacts		0.491			
Had to learn because business is complex (RC)			0.807		
Doing business locally is challenging due to community & cultural dimensions (RC)				0.668	
Not able to hire technical people (RC)				0.399	
Have created relations w/ people & firms in our industry					0.620
Do not have necessary business sales relations (RC)		0.318			0.387

RC item reverse coded in data capture

Table 3: Hierarchical Regression Results

Model DV: Knowledge Resource	1 Startup	2 Startup	3 Complexity	4 Complexity	5 Startup	6 Complexity	7 Startup	8 Complexity
Control Variables Firm size Network newness of info Network frequency	0.363***	0.387***	-0.120	-0.144	0.352***	-0.089	0.342*** -0.276** -0.176*	0.003 0.439 0.541
Independent Variables CEO industry relatedness CEO business relatedness CEO position relatedness Mgrs industry relatedness Mgrs business relatedness Mgrs position relatedness CEO startup experience Mgrs startup experience CEO network intensity	-0.161 0.086 0.280***	0.136 0.159 -0.057	0.115 0.049 -0.102	0.688*** -0.691*** -0.134	0.120 0.046	-0.105 0.058	0.852*	-0.774
F df R2 Change in R2	5.071*** 76, 4 0.211 0.077**	3.604*** 67, 4 0.177 0.025	0.824 76, 4 0.042 0.046	3.803*** 67, 4 0.185 0.174***	3.751** 66, 3 0.146 0.019	0.496 66, 3 0.022 0.011	5.011*** 57, 4 0.260 0.066*	0.181 57, 4 0.013 0.012

* p < .10
 ** p < .05
 *** p < .01

Appendix A: Survey Items (Arranged Categorically by Resource Category)

Tacit Knowledge

- It has been a challenge for us because of the complexity of starting and growing a business.
- We spent (or are still spending) a long time learning how to start and grow this business.
- We were readily able to identify and quantify the information we needed to know in order to start and grow the business.
- We had a lot to learn because the nature of our type of business is complex and difficult to understand.
- Doing business in this geographic area is challenging because of community and cultural dimensions.
- The startup of this company presented challenges that we knew how to overcome.
- It is impossible for anyone in our company to know everything about the startup and growth process.

Human Resources

- The top management team is strong and complete.
- We are not able to hire the technical people we need.
- Growing our business presents very difficult management challenges.

Social Resources

- Local and community contacts have greatly assisted in the development of the company.
- We do not have the necessary business sales relationships.
- We have created important new external industry relations.

Technical Resources

- We have a strong innovative capability.
- We lack technical and engineering capability we need.
- We have access to or are developing proprietary technology.

Physical Resources

- Our facilities do not meet our needs.
- We have excellent manufacturing and/or laboratory equipment.

Financial Resources

- We have the necessary financial sources and contacts.
- Local sources of financing have been important to us.
- We have financial reporting and controls in place.
- We have developed relationships with financial institutions outside this area.

Organizational (Managerial) Resources

- Our employees at all levels are motivated.
- We understand the market for our products/services.
- Structure and planning in our company have helped us.
- Our manufacturing or production know-how is excellent.
- Periodically we formally assess our business development.
- We have a culture and values that make a difference.

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