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Citation: Bhalla, A. & Terjesen, S. (2013). Cannot make do without you: Outsourcing by knowledge-intensive new firms in supplier networks. Industrial Marketing Management, 42(2), pp. 166-179. doi: 10.1016/j.indmarman.2012.12.005

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Link to published version: https://doi.org/10.1016/j.indmarman.2012.12.005

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Cannot Make Do Without You:
Outsourcing by Knowledge-Intensive New Firms in Supplier Networks

Industrial Marketing Management. Feb2013, Vol. 42 Issue 2, p166-179. 14p.

DOI: 10.1016/j.indmarman.2012.12.005.

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Keywords: *new firms, supplier networks, outsourcing capability, case studies.*

Cannot Make Do Without You:

Outsourcing by Knowledge-Intensive New Firms in Supplier Networks

Abstract
How do new firms operating in dynamic environments organize their operations? Building on transaction cost theory and the resource based view and using case study data from ten biotechnology start-ups and twenty of their suppliers, this research reveals that new firms outsourcing to highly-embedded suppliers are likely to secure access to a wider supplier network, attain best-in-class operational knowledge, and avoid supplier opportunism while facing low levels of relationship-specific investments. New firms outsourcing to suppliers at the network periphery are more likely to realize cost efficiencies, expose themselves to opportunism, uncertainty, and higher levels of relationship-specific investments but low levels of operational knowledge. We propose that new firms build five outsourcing competencies to realize benefits.

Keywords: *new firms, supplier networks, outsourcing capability*

Acknowledgements: We thank the special issue editors and reviewers for their insightful feedback and guidance on earlier versions of this manuscript.

1. INTRODUCTION

Outsourcing is a strategic move which involves both sourcing absent activities that new firms may not have completed in-house in the past, or the substitution of internal activities by transferring these, in part or whole, to a third party supplier that performs the task, function, or process (Gilley & Rasheed, 2000; Holcomb & Hitt, 2007). Advances in information and communication technologies have enabled new firms to pursue the outsourcing of value-creating activities such as software development, engineering, and research and development (Hui, Davis-Blake & Broschak, 2008). To date, researchers have focused on outsourcing by large, established firms (McIvor, 2009; Bhalla, Sodhi and Byung-Gak, 2008); however there is evidence that new biotechnology firms also utilize intermediate markets for a variety of value chain activities (Mills, 2002).

Why might new firms outsource activities, including value-creating activities such as research and development, which are known to contribute to the value-creating potential of

firms (Kumar, Van Fenema, & Von Glinow, 2009)? Researchers subscribing to the integrated view of transaction cost theory (TCT) and resource-based view (RBV) argue that by establishing relationships specifically with high-status firms, new firms can not only reduce the search and monitoring costs associated with finding a reliable partner but also acquire recognition and use it to draw vital combinations of resources such as status and physical resources (Lin, Yang, & Arya, 2009). This is crucial for new firms as they face adverse initial resource and capability barriers such as scarcity of talent and operational know-how, presented by liabilities of newness and smallness. (Stinchcombe, 1965; Aldrich & Auster, 1986; Baum & Oliver, 1992). In response to these difficulties, new firms must mobilize resources in unusual ways, while economizing on resource requirements (Baker & Nelson, 2005). Forming supplier relationships is appealing for new firms as it opens up the possibility to tap into supplier competencies (Hugo & Garnsey, 2005). New biotechnology firms, for instance, often opt to outsource high value-added R&D activities such as the construction of genome databases to avoid significant fixed operational costs and expand their flexibility to scale appropriately. By supplier, we refer to any outsourcing partner.

By their nascent nature, new firms often possess little experience and use immature and unrefined operating routines (Baum & Silverman, 2004). On the other hand, suppliers - for instance, law firms handling regulatory approval and compliance or dedicated research centers focusing on conducting clinical trials - are more likely to have perfected a small number of organization routines and developed specialization which new firms are unable to match (Huckman & Zinner, 2008). To increase their ability to introduce radical innovations and make a commercial breakthrough, new firms may have no option other than to outsource value-creating activities.

When selecting specialized suppliers for value-creating activities, new firms are faced with a choice of suppliers who are either embedded in the network or are less established and

operating at the network periphery. By outsourcing to embedded suppliers, new firms can promote embeddedness in knowledge-intensive networks and improve their access to market intelligence and ability to find solutions to complex problems (Uzzi, 1997; Song & Thieme, 2009). Relationships with embedded suppliers can also confer external legitimacy on a new firm signaling to the wider network that the firm has access to the capabilities and resources needed for successful product introduction (Rao, Chandy, & Prabhu, 2008).

However, embedded suppliers may be out of reach for new firms as they are likely to be less flexible in offering attractive terms and conditions, leading new firms to opt for suppliers operating at the network periphery. New firms thus need to develop competencies so that they can draw benefits from outsourcing in supplier networks, while avoiding supplier opportunism. While there is much debate concerning the underlying drivers and complexities of outsourcing in large, established firms operating in mature industries (e.g. Tapon & Thong, 1999; Kroes & Ghosh, 2010) and the capabilities these firms need when outsourcing large projects (Ranganathan & Balaji, 2007; Davies, Gann, & Douglas, 2009), most research overlooks the experiences of new firms outsourcing to expand their competencies and access supplier networks. It also ignores the competencies that new venture managers need to develop to outsource effectively in knowledge-intensive networks (McGee, Dowling & Megginson, 1995; Dowling & Helm, 2005; Arikan & McGahan, 2010). Scholars have also called for further research on the processes of integration and measurement of value chain capabilities and the need to consider a wide range of research settings (Holcomb & Hitt, 2007; McIvor, 2009), including biotechnology (McGrath & Nerkar, 2004) and start-ups.

The present study answers these calls by focusing on two exploratory research questions: First, how do new firms use outsourcing to access valuable resources and capabilities residing in supplier networks, and second, what capabilities do new firms need to successfully outsource in supplier networks? The terms new firm, start-up, and venture are

used interchangeably to refer to independent, early stage entrepreneurial ventures that are three years or younger. We investigate a range of outsourced activities, particularly focusing on value-creating activities of a 'knowledge-intensive' nature (Gupta, Woodside, Dubelaar & Bradmore, 2009) such as pre-clinical and clinical research, legal, business development, and marketing.

This research makes the following contributions. First, in providing one of the first empirical studies of outsourcing by new firms operating in dynamic, knowledge-intensive industries, the present study investigates the role of suppliers' embeddedness on outsourcing experience. We point out that when outsourcing, new firms need to balance the need to access best-in-class knowledge and networks of highly-embedded suppliers and the low relationship-specific investments these suppliers may make in case of new firms. Furthermore, this research investigates the competencies that new firms must possess to realize benefits from outsourcing, specifying the importance of technical, evaluation, relational, entrepreneurial, and integration competencies. Finally, based on the above, we offer implications for theory, practice, and future research.

2. THEORETICAL FOUNDATION

Globalization, environmental turbulence, and the centrality of speed to innovate lead firms to pay close attention to the strategic decision to outsource or to vertically integrate value chain activities. Technological advances enable firms to easily exchange data and coordinate activities, giving rise to a radical new vision of a firm as one in which individual companies outsource many activities to an array of partners (Chesbrough & Appleyard, 2007). On the other hand, integration may be a necessity for new firms to create competitive advantage by building unique bundles of assets and resources that can be deployed in distinctive ways (Barney, 1991). TCT and RBV scholars have devoted a great deal of

attention to this managerial paradox, and enhanced our understanding of how transaction costs and firm specific capabilities influence firms' vertical boundary decisions (Ellram, Tate, & Billington, 2008; Vivek, Banwet, & Shankar, 2008). These theories provide insight into dealing with liabilities of newness, smallness, and unconnectedness.

2.1. New firms and the necessity to outsource

The central argument of TCT is the economics of specialization and the administrative and incentive limits of organization hierarchies compared to markets (Williamson, 1981, 1991). New firms may be particularly attracted to competitive market tendering to minimize the bureaucratic costs of coordinating activities in-house and to secure the most efficient pricing and quality available in the market (Brettel et al., 2011). Emphasizing the benefits of market exchange, Alston and Gillespie point out "…unless there are costs associated with using the market, transactions will not be organized through firms. Organization through a firm creates depreciation, agency, coordination, and shirking costs which will not be incurred unless there are larger costs associated with market transactions" (1989: 199).

However, new firms face greater uncertainty of continuity and identity (Michael, 2007), and in the absence of prior transaction experience are more likely to be unable to forecast contractual hazards that may emerge from potential opportunism by their contractual partners, and devise contractual structures to mitigate them (Provan & Skinner, 1989; Stump & Heide, 1996; Mayer & Argyres, 2004). Furthermore, new firms are still in the process of negotiation with resource gatekeepers such as financial providers or reputable suppliers and strive to secure legitimacy (Zimmerman & Zeitz, 2002). New firms have few suppliers to choose from due to financial constraints (Song & Di Benedetto, 2008), face uncertain market conditions, and may possess little accurate information relevant to the transaction. For these new firms there are benefits to internalizing the transaction and exercising managerial fiat.

RBV scholars provide support to this by pointing out that the firm is a heterogeneous

entity consisting of bundles of idiosyncratic resources (Wernerfelt, 1984). Furthermore, because most valuable capabilities reside in the firm and are idiosyncratic in nature (Sirmon, Gove, & Hitt, 2008), new firms must build resource-position barriers by focusing on internal resource development. For instance, new firms could develop intangible resources such as proficient industry-specific human capital (Peteraf & Barney, 2003) which if superior relative to competitors could result in securing much needed comparative resource advantage (Jacobides & Winter, 2005). After all, suppliers are unlikely to perceive benefits in developing relationship-specific human capital for a new firm due to a lack of previous ties and, if they do, both parties may be exposed to a high degree of opportunism (Williamson, 1991).

Relative to established firms, new firms are yet to build a resource portfolio (Sirmon, Hitt, & Ireland, 2007) and need access to the best possible operational knowledge, while facing urgency to minimize costs and conserve precious financial resources. As a result, new firms are likely to seek suppliers for value-creating activities involving know-how, such as research and development (Song & Di Benedetto, 2008) and legal work (Bagley, 2008). Access to suppliers possessing capabilities to carry out such activities may determine new firms' survival in the marketplace (Song & Di Benedetto, 2008). New firms are unable to match the depth of specialist knowledge possessed by suppliers (Quinn, 2000). For example, new firms find it increasingly difficult to acquire, develop, and retain the people and technical know-how in-house (Kor & Misangyi, 2008). There is also hesitation about the new firm's ability to afford development risks for any desired innovation, as compared to suppliers who have vested interests in innovation and can spread risks across multiple present and future clients (Quinn, 2000). Developing a relationship with a supplier with a high degree of related skills to what the new firm seeks to develop (Gulbrandsen, Sandvik, & Haugland, 2009) may help the new firm to speed its products to market and also to learn faster. A recent study by

Song and Di Benedetto (2008) points out that new firms need to work harder to encourage supplier involvement in new product development processes.

Relying on suppliers may expose the new firm to opportunism, including ex-post hold-up behavior by limiting the ability to switch suppliers. For instance, in order to make relationship-specific investments such as recruiting scientists with specific microbiology experience and skills, a supplier may insist on a long term contract. New firms may also find it difficult to realize superior performance from working with suppliers. Performance measurement requires mitigating the operational risk of outsourcing by developing effective metrics, and new firms are more likely to lack this experience. This increases operational risk as new firms' outsourcing processes face performance ambiguity, thus making it difficult to discern the level of performance received (Shervani, Frazier, & Challaganga, 2007).

2.2. New firms and supplier networks

How do new firms operating in R&D-driven industries such as biotechnology access fine-grained product or market information, and resources that may be difficult to develop or acquire otherwise? Researchers have highlighted the central role of network embeddedness which describes the structure of a firm's ties with other firms – in particular, the extent to which a firm is connected with its partners, and how interconnected those firms are with each other (Uzzi, 1997; Echols & Tsai, 2005; Hallen, 2008). Described as stable networks where exchange partners reinforce trust, information exchange, and joint problem solving by maintaining close social relationships (Uzzi, 1997), new firms may pursue outsourcing to access suppliers who are already embedded in the industry.

This is because in such industries, the locus of innovation is found in networks of learning, rather in individual firms (Powell et al., 1996). Powell et al. (1996) show that biotechnology ventures that form greater numbers of R&D alliances and diversity of ties at early stages are able to secure key resources and a central network position. Thus outsourcing

may enable new firms to benefit from "thick" information exchange of tacit and proprietary know-how with suppliers (Helper, 1990) and network transparency and, in turn, reduce the opportunistic supplier behavior (Provan, 1993).

In the case of new biotechnology firms, supplier arrangements with service intermediaries such as accounting and financial services firms or law firms are key to accessing the wider supplier network. In a recent study of new firms operating in technology clusters, Zhang and Li (2010) point out that service intermediaries sitting at the intersection of many firms, organizations, and industries can help new firms plug into their extensive networks by reducing innovation search costs.

Securing endorsement from reputable service intermediaries may further enable new firms to acquire external legitimacy and send quality signals to the market, allowing them to form relationships with other higher status suppliers operating within the network (Stuart, Hoang, & Hybels, 1999; Jensen & Roy, 2008) and, in turn, benefit from their reputation (Saxton, 1997). However, due to liabilities of newness and unconnectedness, new firms may be unable to establish relationships with such suppliers (Gulati & Gargiulo, 1999). As a result, new firms' search for reputable suppliers may ultimately lead them to choose suppliers who operate at the network periphery, are less-embedded, and adapt what Ahuja, Polidoro, and Mitchell (2009: 942) term as a "creeping strategy of working one's way towards the center of the network." In sum, new firms may use outsourcing as a doorway to the reputable suppliers operating at the center of network, and unlock the highly valued benefits, even if it exposes them to greater transaction costs initially.

2.3. Developing competencies to make the most from outsourcing in supplier networks

New firms face greater likelihood of higher transaction costs and need to form embedded exchange relationships to avoid sub-standard performance while outsourcing in

knowledge-intensive industries, and hence must develop competencies to outsource effectively. Researchers have emphasized two types of such competencies. First, relational competencies rely on social processes to promote norms of flexibility, solidarity, and information exchange (Poppo & Zenger, 2002) and often emerge from previous relational exchanges. For instance, since they are yet to be embedded in a network, new firms may have to rely on their social contacts to seek information which more established and embedded firms take for given. Second, in the absence of embedded relationships, new firms may have to opt for arm's length-based exchange relationships, relying on contracts specifying each side's obligations and building a capability to monitor the supplier. New firms must possess contracting capabilities, i.e. learning how much and what kinds of detail to include in a contract (Argyres & Mayer, 2007; Katila, Rosenberger, & Eisenhardt, 2008) to deter misappropriation and ex-post hold-ups resulting from external uncertainty and changing needs (Williamson, 1991; Wolter & Veloso, 2008).

However, new firms may need to expand their competencies beyond relational and contracting skills. Researchers studying alliances and megaprojects have highlighted various competencies which may be relevant to new firms engaging in outsourcing. Kale and Singh (2007) suggest the need for a dedicated alliance office to improve alliance performance. Investigating the success in managing megaprojects, Davies et al. (2009) points out the importance of operational, program management, and systems integration processes. Schreiner, Kale, and Corsten (2009) highlight the importance of coordination, communication and bonding skills. Lampel (2001) and Ranganathan and Balaji (2007) note the importance of evaluative competencies in the form of vendor selection and management.

In the case of a new firm, many of these competencies are likely to be relevant and may boost its ability to seek and form embedded relationships with suppliers operating at the center or periphery of the network. For instance, as a new firm lacks technical know-how of

value-creating activities, it must be able to evaluate supplier risk based on available information. Equally, a new firm must possess entrepreneurial competencies such as the ability to search for reputable suppliers, sell its proposition on attractive terms in an attempt to convince suppliers to make relationship-specific investments, and connect it with other reputable suppliers.

Building on the above discussion, we explore how outsourcing is at the heart of knowledge-intensive new firms' operations – from cutting costs to seeking operational knowledge and legitimacy from suppliers embedded in a knowledge-intensive network – to attain a commercial breakthrough. New firms trade off the gains from outsourcing to suppliers embedded in the network vis-à-vis potential opportunism, uncertainty, and the need for relationship-specific investment. Given new firms' limited resources and high failure rates (Carter, 1999; Shepherd, Douglas, & Stanley, 2000), we investigate the importance of building key competencies to ensure benefits are captured from supplier relationships. The next sections describe the biotechnology industry context, present the methodology and data and our findings, and discuss the implications for practice and future research.

3. CONTEXT: NEW FIRMS IN THE BIOTECHNOLOGY INDUSTRY

Context is critical to any study of firm behavior (Johns, 2006). The biotechnology industry is characterized by high levels of knowledge, technology, and modularization and has undergone a series of dramatic changes in recent history (Galambos & Sturchio, 1998). Traditionally, large established pharmaceutical firms were responsible for most innovations; however since the 1970s, new, small biotechnology firms have launched more innovations (Galambos & Sturchio, 1998). Biotechnology firms are founded by individuals who believe that they possess some unique specialized knowledge and can organize effectively to seize a market opportunity (Haeussler, 2011). Biotechnology start-ups account for the majority of

venture capital investments (NVCA, 2011) and are also funded by the scientist(s) and business angels. Biotechnology start-up failure rates are extremely high and can occur at any stage of development, from drug discovery to clinical trials to distribution. The priority for speed to patent and to market motivates biotechnology firms to develop partnerships with other organizations (Powell et al., 1996). The Biotechnology Industry Organization (BIO) defines biotechnology as including new therapies, vaccines, and medical diagnostics.

Large pharmaceutical firms' business model of performing most, if not all, activities in house has been successful, however many industry experts advocate outsourcing (*Economist*, 2007). Established biotechnology and pharmaceutical firms that do source tend to do so from one another, and increasingly also new firms (Jefferies & Company, 2009). Indeed, firms of all kinds are becoming more niche-focused and seeking partnerships with others, for example with contract research organizations (CROs), contract manufacturing organizations (CMOs), and knowledge process organizations (KPOs) (Goodall et al., 2006; Tapon & Thong, 2009). Industry players can often be found in geographic clusters such as North Carolina's Research Triangle or Cambridge's Science Park where it is easy to identify, contract and monitor partners. Increasingly, partners can also be found in India and China which enjoy a huge and relatively less costly talent pool, growing numbers of Western-trained returned immigrants, large clinical patient populations, and solid government support (Goodall et al., 2006). As successful biotechnology start-ups play a key role in economic development (*Economist*, 2009; van Stel, Carree, & Thurik, 2005), local, regional, and national governments around the world devote significant resources toward their establishment and support (BIO, 2010).

In the biotechnology industry, firm activities can be decomposed into discrete components of work (Tapon & Thong, 1999; Goodall et al., 2006). Suppliers exist for all components of a biotechnology firm's value chain activities. Primary activities include inbound logistics (e.g. goods required for clinical testing), operations (e.g. discovery, clinical

tests, regulatory affairs, patent, manufacturing), outbound logistics (e.g. transporting goods to customers), marketing/sales (e.g. TV, journals, direct sales), and service (e.g. customer care). To support these activities, a new biotechnology firm must handle procurement (e.g. raw material purchase), technology development (e.g. genomic databases, mass spectrometry), human resource management (e.g. recruitment of scientific staff), and firm infrastructure (e.g. strategic planning, information systems, finance, accounting). Taken together, biotechnology is an excellent industry context in which to study outsourcing by new firms.

4. DATA AND METHODOLOGY

Entrepreneurship is characterized by heterogeneous phenomena with 'process' characteristics, making qualitative approaches useful (Davidsson, 2004; Gartner & Birley, 2002). When examining the early phase of new management theory and in close interaction with practitioners, case studies are most useful (Yin, 2009; Eisenhardt, 1989) and often employed in studies of supply chain management (e.g. Ellram, 1996) and entrepreneurship (e.g. Terjesen and Elam, 2009). Gupta et al. (2009) advocated the use of interviews of executives of firms engaged in knowledge-based outsourcing. The present study adopts a qualitative grounded theory approach of ten case studies using interview narratives from managers of ten new biotechnology ventures and twenty of their supplier firms. Data were collected in 2009.

4.1. Data

Potential case studies were identified through the authors' network of biotechnology entrepreneurs on LinkedIn.com, an internet database of professionals. The population of possible firms were screened to focus only on 'ideal' cases of new biotechnology ventures that met the following criteria: three years old or younger, started independently of a large firm, and pursue 'radical' rather than incremental innovation (e.g. focus on a new compound,

new target or new medical device). The case selection of young, highly innovative biotechnology start-ups controls for firm age, size, entrepreneurial orientation, and industry.

We followed Yin (2009) and Eisenhardt (1989)'s guidance to select four to ten unique case studies. To gather viewpoints from different types of biotechnology start-ups, the ten cases selected vary by geographic location, scientific compound/target, age, number of employees, and other characteristics. These diverse cases were selected for replication, theory extension, and elimination of alternative explanations (Eisenhardt & Graebner, 2007; Yin, 2009). A total of fifteen managers of the ten start-ups were interviewed. To gain the important perspective from the other half of the dyad, outsourced suppliers to each venture were also interviewed, totaling twenty-five managers among twenty supplier firms. Due to the highly confidential nature of the biotechnology industry, the identities of all firms and suppliers are disguised. For this reason, the exact firm location, number of employees, funding, and revenues are not reported. The case studies are depicted in Table 1.

[Insert Table 1 about here]

4.2. Methodology

Our qualitative methodology follows the steps outlined in Glaser and Strauss (1967). First we developed key research questions on the phenomenon of new biotechnology firms' outsourcing and pilot tested this protocol on a firm and one of its suppliers.

Second, we pursued theoretical sampling by collecting data from ventures and their suppliers. We sought multiple perspectives from each firm; however this was not always possible as some new ventures had only one manager (often the business manager) who could speak to the supplier relationships. On the supplier side, some suppliers were sole proprietors or there was only one contact person who managed the relationship with the start-up.

The semi-structured, in-depth interviews were conducted in person or by phone,

depending on geographic distance and managers' availability. The venture founder interview began with open-ended questions to facilitate the sharing of narratives including 'Can you tell me about your venture?' As the entrepreneurs shared observations, they were asked further questions to gather more details and rich descriptions and to understand better why the experience was important. In the course of the interviews, the entrepreneurs identified outsourcing partners. As formal contracting is a pure form of outsourcing (Rothaermel et al., 2006), entrepreneurs were asked to provide contact details for managers of at least two formally contracted outsourcers who might be willing to be interviewed. Next, the outsourcing partners were interviewed following a similar framework to that outlined above but also focusing on questions such as 'How did you come to be involved in outsourcing to the start-up?' At the conclusion, interviewees were asked to share any other thoughts or information that seemed relevant. See Appendix A for the initial semi-structured interview guide. Interview length varied from 30 to 90 minutes. Both start-up and supplier interviews were transcribed verbatim to systematically analyze the raw data. The interviews could best be described as narratives about firm experiences. Narratives explore individuals' perceptions of their environments (Boje, 1991), drawing on memories and current experiences (Bartel & Garud, 2009). Despite the post-hoc sense-making nature of narratives, they can be used to develop grounded theory of entrepreneurs' venture strategies (e.g., Martens, Jennings, & Jennings, 2007) and related fields (Wagner, Lukassen, & Mahlendorf, 2010).

Secondary data about the ventures, their founders and managers and outsourcing partners were gathered through news media, Google searches, analyst reports, and other publicly available sources. The ventures' websites provided short biographies of co-founders and managers and a description of the firm's value proposition. Academic databases facilitated the collection of the titles and abstracts of founders' scientific publications.

Third, with each new set of interviews and secondary data, we began a process of

constant comparative analyses across cases by repeatedly reading all interview transcripts and other case materials. Consistent with the methodology recommended in Glaser and Strauss (1967) and employed by Nag, Corley, and Gioia (2007), we identified first-order codes that were most often terms used by the interviewees, for example "Need for supplier trust," "Need for supplier quality service," and "Need for supplier relationship over time." Themes were sought in the interviews (within-case analysis) and across the complete string of cases (cross-case pattern search). Major second-order themes were noted and continuously modified with emerging evidence from primary and secondary data, for example "Supplier relationship imperatives" and "Supplier relationship difficulties." Care was taken to elicit the underlying themes and question the 'truth' shared in the narratives rather than rely on a priori categories. We compared and discussed our coding and categories with one another. Inter-rater reliability was high and differences were resolved using a third coder, a research assistant of the second author. During this iterative process between data and analysis, it became clear that it was important to seek perspectives from multiple suppliers to each firm. Based on the grounded theory that emerged from the data, we conducted a literature review of existing theories in fields related to entrepreneurial firms' operations management, including supply chain management, strategy, and entrepreneurship, deciding on TCT and RBV as the most appropriate theoretical frameworks through which to triangulate the data due to their ability to examine and explain liabilities of newness and smallness.

We took steps to minimize the bias from recall and rationalization. We collected broad data about the industry from leading biotechnology research and practitioner journals, white papers, industry websites, and other sources. We toured two incubators for biotechnology start-ups and discussed our research with industry experts. This enabled us to triangulate our finding to construct reliable interpretations (Zott & Huy, 2007; Yin, 2009) and also informed the discussion of the context of the biotechnology industry. We also interviewed highly

knowledgeable individuals from different management levels, functional areas, and geographies who all view the focal phenomenon (new firm decision processes), albeit from different perspectives. These individuals are considered to be the most reliable when recalling important recent events (Eisenhardt & Graebner, 2007). Furthermore, the interviewees relayed information about both retrospective and real-time outsourcing decisions, thus mitigating bias (Eisenhardt & Graebner, 2007). Taken together, this methodology helped to ensure internal validity, construct validity, external validity, and reliability (Gibbert, Ruigrok, & Wicki, 2008). Table 2 depicts the supporting evidence for the overarching themes.

[Insert Table 2 about here]

5. RESULTS

5.1. Outsourcing as an entry ticket to the supplier network

New firms must overcome liabilities of smallness, newness, and unconnectedness. New firms operate at the periphery of the networks where information flows occur within highly-embedded firms. Access to the network is thus critical to compensate for the lack of resources available to new firms. These interorganizational relations enable access to vital knowledge, promote learning and, in turn, enhance firm performance. New firms have several routes available to develop interorganizational relationships and thus overcome the liabilities of newness, smallness, and unconnectedness. For instance, a new firm sends legitimacy signals by forming alliances with credible or higher status partners through the entrepreneur's social network (Ozcan & Eisenhardt, 2009; Partanen et al., 2008), appointing independent directors with significant managerial industry experience (Kor & Misangyi, 2008), attracting investments from reputed financiers (Hallen, 2008), and hiring scientists (Luo, Koput & Powell, 2009).

Due to liabilities of smallness, newness, and unconnectedness, new firms may not be able to secure medium or long-term term alliances with reputable suppliers at attractive terms

and conditions, and during early phases, outsourcing on a project basis may be the only available option.

They can look towards establishing supplier relationships with service intermediaries such as clinical research organization (CRO) suppliers, which are known to act as knowledge process organization (KPO) suppliers to multinational pharmaceutical firms. CROs are vital to new biotechnology firms, as they may be highly-embedded within the industry and open up favorable terms of trade with exchange partners or other central actors within the network.

During our interviews, all ten venture cases provided evidence that outsourcing acts as an entry ticket for new firms into the indispensable supplier network which can determine survival and performance. For example, An Eta manager described how "quintiles" which are large, embedded global firms can often provide access to other top tier suppliers. As another example, Theta's supplier describes the allure of the firm's network,

> "[Theta] were attracted to us because we are central to the network. We know the Indiana Health Industry Forum, Biocrossroads [a for-profit life science focused association], and are very networked in with start-ups coming out of tech transfer at Purdue, Indiana, Rose Hulman and Notre Dame… I had my old contacts at [former employer large pharmaceutical]. We connected them to this community."

Proposition 1: New firms are attracted to highly-embedded suppliers as they perceive these suppliers are more likely to enable them overcome liabilities of newness and secure swift access to the wider supplier network.

5.2. Outsourcing to attain cost efficiency in supplier networks

New firms struggle with mobilizing resources, and ones that are able to rapidly accumulate superior resource bases are more likely to overcome liabilities of newness and to respond to dynamic environmental conditions. However, for new firms, organic development of resources can be slow, expensive, or unavailable (Graebner & Eisenhardt, 2004). Operating with limited internal scale, new firms are unlikely to run internal operations efficiently and

might realize substantial cost and efficiency savings from outsourcing.

New firms operating in dynamic environments can cut costs and build flexibility by outsourcing modules to specialized suppliers such as CROs with the capacity to aggregate the demands of multiple clients, thereby achieving scale economies unavailable to new firms. Reputable suppliers operating at the center of the network are more likely to charge a premium to send signals of best-in-class knowledge and quality than cost reduction, which is more likely to be used as a promise by less-reputable suppliers operating at the network periphery. The following quotes illustrate the cost efficiencies:

> "Quintiles are what we call the really well known global firms like Lonza or Boehringer-Ingelheim. They have a big name and lots of capacity but you pay a premium. Meanwhile there are other firms that have managed to get the product through to clinical development- that have ticked all the boxes as far as that goes- but aren't as well known so you can squeeze a little bit more on the price." – Eta manager

> "We do a standard $25/hr discount for start-ups because we started at the high tech life cycle incubator at the university." – Theta supplier of marketing and sales

Proposition 2: New firms outsourcing to suppliers operating at the network periphery are likely to attain cost efficiencies.

5.3. Outsourcing at the network periphery versus in the embedded supplier network

Outsourcing to highly reputable suppliers embedded in the network is highly attractive as it opens up the opportunity to establish direct ties and access the supplier's network of other highly reputable suppliers, possibility of endorsements, and sharing of informal information and new ideas that may benefit the new firm and strengthen the social cohesion and generate network-wide benefits (Provan, 1993). However, in the absence of previous ties, gaining access to the highly-embedded supplier network is difficult and may require new firms to 'make do' with what the highly-embedded supplier offers. This may require new firms to compromise both on seeking cost efficiencies and looking towards suppliers to make

firm-specific relational investments.

For new firms, both cost efficiencies and relationship impediments are likely to be on the priority list and new firms may react by looking towards suppliers operating at the network periphery. These less-embedded suppliers may offer greater cost efficiencies, and make new firm-specific investments such as recruiting R&D staff and buying equipment. The promise of being 'in it together' and interdependent on each other (Ahuja et al., 2009) may be far too attractive to ignore for both new firms and suppliers. However, these less-embedded suppliers may be working towards moving to the center of the network and seeking established buyers as this could bestow benefits such as enhanced recognition and the ability to attract better talent and ultimately command better margins and faster growth. As a result, the greater uncertainty associated when dealing with new firms may prompt less-embedded suppliers to act opportunistically.

In addition to cost efficiencies, we explored start-ups' other experiences, particularly related to opportunism, uncertainty, and relationship-specific investment. An Iota co-founder described "being taken advantage of… always." According to an Eta manager, the start-up's venture capitalists are "cost conscious because they will want to keep any expense to an absolute minimum. At the same time, they realize it's garbage in-garbage out. A fly by night firm won't give them the same high level of service." A Zeta manager shared the following experience of working with a peripheral CRO which resulted in delays, highlighting the exposure to transaction costs such as hold-up,

> "On the CRO side, you have to be careful because you are competing for patients. If there is a CRO that specializes in cardiovascular [CV], they may have 2 or 3 clients competing for a certain type of CV patient. They may internally prioritize who gets the patients first so then you are in the queue for who gets your trial... A delay in recruitment means a delay in data generation, and a delay in clinical trial. From a CR standpoint, that's critical."

Proposition 3: New firms outsourcing to suppliers operating at the network periphery expose themselves to opportunism, uncertainty, and low levels of relationship-specific investments.

Our data also provided examples of exposure to low relationship-specific investment. For example, an Epsilon co-founder described how the only molecule supplier with FDA approval didn't invest in building a relationship early on. A Gamma manager shared the experience of having worked with a highly-embedded supplier that provided good quality but in the next round of negotiating, request a 50% increase for the same work and "didn't seem to want to invest in a long-term relationship to help us grow together." An Iota founder's experience is representative:

> "If a vendor treats us like a small company, we treat them like they don't exist… We have some major suppliers. They were starting to treat us poorly. They were trying to make us do companies that big companies don't do like prepay orders. I called them up and said 'This isn't any fun. We have people who are effectively much bigger than you. You aren't a proprietary provider.' We pulled $65K per year of business from them. They went from having $4-5K of our business per month to per year."

Proposition 4: New firms outsourcing to suppliers highly-embedded within networks avoid supplier opportunism, but may face low levels of relationship-specific investments.

5.4. Outsourcing to benefit from operational knowledge in supplier networks

Though new firms may possess scientific knowledge about inputs and outputs ("conceptual knowledge"), they are unlikely to have the operational know-how central to respond effectively to changing environmental conditions and obtain desired results (Tucker, Nembhard, & Edmondson, 2007). For instance, new biotechnology firms rely on CROs' operational knowledge consisting of acquisition, synthesis, and assimilation of information generated by carrying out clinical trial activities during different phases of drug development to speed the new drug development and approval process. This is because new firms experience difficulty in attracting human, financial, and other critical resources needed to develop and commercialize their products.

Specialized suppliers are known to have developed exclusive capabilities through

deliberate and persistent investments in infrastructure and training to improve the client firms' capacity to develop new products and services (Ethiraj, Kale, & Singh, 2005). Access to these capabilities is likely to be particularly attractive to new firms. Since suppliers may have both 'know-how' and 'capacity' greater than an incumbent or resource-scarce new firm, new firms can significantly improve the success rate of new products by involving suppliers who play a vital role by building operational knowledge and economies of scale and delivering non-core yet essential services. The pressure to outsource these activities to suppliers when operating in network is even higher. This is because cutting-edge knowledge central to driving innovation is often widely dispersed across different firms, and new firms must look beyond their boundaries to access such knowledge.

However, new firms may face risks associated with outsourcing idiosyncratic resources. Suppliers can emerge as direct competitors to the new firm. Furthermore, new firms are more likely to be vulnerable to hazards of contract renegotiation with outsourcing suppliers, opportunistic hold-up, or other required relationship-specific investments. This is because new firms do not possess the high market power that enables them to lower transaction costs under high asset specificity and uncertainty (Shervani, Frazier, & Challagalla, 2007).

Bounded by resource constraints and operating under pressure from resource providers to benefit from supplier operational knowledge, new firms are more likely to be concerned with reducing time to market than misappropriation. Furthermore, if new firms are operating in knowledge-intensive industries, the threat of opportunism and misappropriation is likely to be lower, and outsourcing may enable the firm to access suppliers who are more likely to be best-in-class and possess superior operational knowledge. However, suppliers often develop this operational knowledge by closely working with buyers over time, and, in turn, developing relationship-specific assets (Modi & Mabert, 2007). In the case of a new firm with no history, a supplier may be unwilling to develop operational knowledge and make

investments specific to the new firm's business unless it has a vested interest such as a revenue sharing or equity arrangement. In such instances, a new firm may outsource to suppliers operating at the network periphery who are unlikely to have access to best-in-class operational knowledge due to an absence of ties with central network actors. Managers from all ten ventures shared stories of how outsourcing from established firms enabled them to develop further innovations in products, services, or processes. For example, an Epsilon co-founder described how contracted scientists led to an understanding of new applications and global opportunities for their intellectual property. Gamma's embedded manufacturer helped the firm to better understand product build and lead time:

> "I think we have learned a lot about how the product should be built, what key components to consider. What might make more sense from a durability and economic standpoint. We've learned about lead time and so forth."

Proposition 5: New firms outsourcing to highly-embedded suppliers are more likely to attain best-in-class operational knowledge than are firms outsourcing to suppliers operating at the network periphery.

5.5. Outsourcing to attain external legitimacy in the supplier networks

New firms' urgent resource needs also include continuous access to goodwill, funding, talented employees, and suppliers of cutting-edge technology and services. Access to this wider ecosystem requires social acceptance by the institutions and individuals that new firms encounter (Zimmerman & Zeitz, 2002). Resource holders who positively appraise the attractiveness of a new firm's opportunity will provide support (Shane & Stuart, 2002). Based on this backing, other firms may engage in resource exchange with the new firm, often at attractive terms which may otherwise be unavailable.

New firms taking a strategic approach to construct and enhance legitimacy are likely to overcome the resistance of resource gatekeepers and increase growth and performance,

particularly sales (Tornikoski & Newbert, 2007; Zimmerman & Zeitz, 2002). This strategic approach to legitimacy may involve an outsourcing relationship with a reputable firm. Such status is considered to be a signal of quality that affects not only how focal firms are perceived, but also how the firms with which they are affiliated and the activities in which they engage are perceived (Jensen & Roy, 2008; Podolny, 2001). For example, Ernst and Young (2009) report that most biotechnology firms deploy outsourcing to conduct drug discovery and development research. This outsourcing could involve the bio-availability and bio-equivalence of drug substitutes or the effectiveness of a new drug, as well as recruiting patients, preparing clinical databases, and conducting clinical trials. A new biotechnology firm aiming to gain legitimacy and form a thick network with multiple partners in order to move research forward (Audretsch & Feldman, 2003) may start by establishing an outsourcing relationship with a reputable supplier. A high status supplier may help firms to establish legitimacy, mitigate liability of newness, and send signals to customers and the market (Stinchcombe, 1965; Deeds, Mang & Frandsen, 2004).

From their incipience, new biotechnology firms have some possible sources of external legitimacy. A content analysis of the ventures' websites reveals profiles of sources of external legitimacy such as recent awards, scientist founders' degrees from elite universities, and business founders' years of working experience in blue-chip pharmaceuticals or experience with other start-ups. One surprising finding in the interviews was the multiple sources of external legitimacy which entrepreneurs could acquire through outsourcing strategies.

A natural starting point for external legitimacy is a content analysis of the suppliers' services. Supplier websites detailed quality certifications, awards, and relationships to high profile firms of all varieties. Entrepreneurs may have been attracted to these qualities and, in all ten cases, mentioned the role of legitimacy or reputation. For example, an Alpha co-founder spoke highly of their law firm's credibility,

> "They are really well known in the area and lead in this space for dealing with start-ups. Everyone knows that they will only work with you if they think that you have a shot. They wouldn't work with us until they read our business plan."

Entrepreneurs require capital to grow and develop their start-ups. Gaining the attention of important stakeholders such as venture capitalists to secure this capital is not easy, and once attained must be maintained to keep the funding flowing. By forming relationships, in particular with highly-embedded firms, new firms build externally legitimacy in the eyes of venture capitalists. Beta's co-founder described the process,

> "We are raising money and if we are working with well known established firms. That adds credibility to our story."

In other instances, new biotechnology firms with breakthrough products in the pipeline may have already secured the backing of venture capitalists. In such cases, affiliation with a venture capitalist may be key to signaling external legitimacy, securing introductions to highly embedded suppliers, and opening doors to recruiting reputable expertise. By definition, external legitimacy is evaluated by others in the market, including suppliers. The head of strategy at Gamma's research supplier, a publicly-traded global leader in the CRO industry, highlighted the role of the firm's legitimacy,

> "If we do the work, they [client and regulators] believe the data more than if they use some crappy brand new overseas company that no one's ever heard of... In the old days, it was 'let's get the cheap stuff' [suppliers]. But in using a [cheap] mom and pop shop that aren't well known, you get the pharma company saying you have bad data and study results and you have to redo it. A VC isn't going to trust that data either."

Proposition 6: New firms' requirements for attaining network legitimacy, in particular securing the attention of venture capitalists, positively affect the likelihood of seeking highly-embedded suppliers.

5.6. Realizing success: The role of outsourcing capability in supplier networks

As proposed above, outsourcing can provide new firms suffering from the liability of

unconnectedness an entry point into the network, and realize benefits such as access to the supplier's network resources (Ahuja et al., 2009) to collect legitimacy and visibility (Stuart et al., 1999), supplier knowledge (Song & Di Benedetto, 2008), and cost efficiencies with lower risk of opportunism (Provan, 1993). New firms often lack the resources or scale to construct new structural mechanisms, codify knowledge, develop organizations skills, and extract benefits from suppliers. Since new firms are yet to master know-how, routines, and relational or contractual governance mechanisms to derive benefits from supplier relationships, entrepreneurial skills to form, implement, and nurture multiple outsourcing relationships can be key to realizing benefits from outsourcing.

Based on our fieldwork, we propose that new firms aiming to realize benefits from supplier networks need to develop and integrate five competencies to create outsourcing capability: Technical, Evaluation, Relational, Entrepreneurial, and Integration. First, technical competencies concern entrepreneurs' need to understand the technical and cost issues involved in selecting and managing a supplier, and develop a capability to absorb technical knowledge from external sources within the network other than the supplier. For instance, when outsourcing to suppliers who are embedded in the wider network, new firms have greater access to industry best practices faster than they would if they were operating outside the network. By simultaneously developing technical knowledge of activities outsourced to suppliers, new firms can reduce the threat of potential opportunism and manage uncertainty better by being a step ahead of suppliers. Second, evaluation competencies entailed the ability to evaluate a supplier's proposal, capabilities, and service level agreement. Third, new firms need to invest in relational competencies which enforce trust and promote collaboration, especially when activities encompass product development or research collaborations, where the output is yet to be realized and both parties agree to general terms in signed contracts, but costs run on a project-by-project basis. New firms need to establish a joint team and task

senior executives with establishing mechanisms for shared decision making (e.g. regular periodic reviews and coordination meetings) and formal conflict resolution procedures that rely on two-way communications and collaborative problem solving. This requires new firms to invest in formal and informal negotiation skills, supplier management, dispute avoidance, and resolution.

Fourthly, we observed that entrepreneurial competencies involving supplier search and identification, supplier intelligence, and quick assessment of a developing situation are likely to be an important source of establishing success in new firms' outsourcing initiatives. Entrepreneurial competencies also consist of making deliberate investments in building social capital across the different types of networks new firms may require for access to resources and capabilities.

Finally, new firms must develop integrative operational skills. Operational skills are essential because new firms operating in innovation-driven networks such as biotechnology bridge loosely-coupled environments and need to create a strategic fit from a set of interlocking value-creating activities spanning the value chain, many of which for new firms are outsourced to suppliers. For instance, in the case of biotechnology firms, the activity system comprises value chain activities such as funding, research partnerships with universities, clinical research and development activities, technology systems and support, manufacturing and marketing, legal services, medical affairs, and regulatory compliance. At an operational level, new firms must understand interdependencies across outsourced work to reduce the informational stickiness that emerges when transferring knowledge-intensive work to suppliers.

This challenge is particularly accentuated in the case of new biotechnology firms, most of which act as liaison brokers, interconnecting universities which generate intellectual property and downstream pharmaceutical firms (Stuart, Ozdemir, & Ding, 2007). This is

because firms do not take into account how the elements in the core configuration are linked in complicated webs of relations with each other and with peripheral elements (Baron, Hannan, & Burton, 1999). Managing this interdependence requires new firms to develop formal mechanisms such as scaled down project management office and informal mechanisms, which promote intensive interaction, communication, and coordination with counterparts across various activities within the value chain. As new firms evolve, entrepreneurs and managers need to spend considerable effort on both improving the activities, and reinforcing and refining the linkages among the activity elements that make up the configuration.

Managers of all ten ventures report some close monitoring of supplier performance. Beta's co-founder describes how suppliers' metrics are checked daily for quality, on-time delivery, production capacity, and fulfilment requirements. Delta scrutinizes the business development manager's new client identification and follow-up processes. Kappa's founder relayed the importance of entrepreneurial skills,

> "I had twenty plus years at [large pharmaceutical firm] but if I had just left there, I wouldn't be the right fit [for running a new firm]. After leaving, I worked at a smaller start-up and got the strategy and business planning and saw the whole business. I had the industry knowledge and understanding, but I got networked into the start-up market from working at that start-up... and learned how to run a company."

On the other side of the dyad, Delta's supplier offered insight into a failed new firm due to a lack of technical, evaluation and relational competencies:

> "My present client has forgotten a lot of details because he is running the show in the organization. But he knows what he needs to know. He knows that I can't BS him and I know that too. I had another instance [in a different new biotechnology firm] where the person trying to run the show was too inexperienced. I'm not sure how investors let him run the show so long the way. Maybe he could sell snake oil. He just did everything wrong. I was literally throwing my hands up. I ended up telling him, 'You need to get this piece of data.' He would flat out say 'I'm not interested'… That particular company failed."

Proposition 7: New firms are more likely to secure benefits from outsourcing when they have technical, evaluation, relational, entrepreneurial, and integration competencies.

6. DISCUSSION AND CONCLUSION

6.1. Summary of Case Findings

The biotechnology start-ups we interviewed outsourced the bulk of their activities. These important decisions are embedded in operational strategies and can enable them to build operations effectively. The cases illustrate how start-up managers simultaneously consider factors from RBV and TCT perspectives to make outsourcing decisions. Overall, from a RBV perspective, the data demonstrate that the outsourcing decision is often driven by a firm's ambition to create resource inputs that are specialized and tailored to its needs. Furthermore, new firms reconfigure these resources into capabilities to seize the benefits from outsourcing and to create a unique and sustainable market position. Often a new firm lacks existing resource inputs and has to *'make do'* with the resource endowments available in its environment. Outsourcing is a part of this proactive making do which provides flexibility but also creates tension: flexibility to screen and discover niches and the need to focus on creating few important capabilities, and tension because it raises the risk of appropriation by the outsourcing partners.

From a TCT perspective, the cases provide extensive evidence of how start-ups deploy outsourcing for multiple strategic reasons including securing efficiencies, building knowledge, accessing the wider supplier network, and acquiring external legitimacy.

The cases highlight the role of the suppliers' embeddedness in a network. Highly-embedded suppliers signal reputation and status, and can provide new firms with access to a wider supplier network at favorable terms, best-in-class operational knowledge, and limited supplier opportunism. However, highly-embedded suppliers are likely to make low levels of relationship-specific investments in new firms unless they have a vested interest. In contrast, new firms that outsource to network periphery suppliers are more likely to realize cost efficiencies, expose themselves to opportunism, uncertainty, and higher levels of relationship-

specific investments. These network periphery firms have low levels of operational know-how specific to the new firm's operation.

To realize success from supplier relationships, new firms must develop and combine resources to build technical, evaluation, relational, entrepreneurial, and integration competencies. Interview narratives with both parties to the outsourcing contract enabled an investigation of integration process facilitators including: working jointly, seeking understanding, and addressing conflicts and failures in early stages. This study offers following implications for theory, practice, and further research.

6.2. Implications for Theory

This study adds to operations management theory by specifying how new firms operating in knowledge-intensive industries rely on outsourcing. It offers three important theoretical implications.

Firstly, we integrate operations management and entrepreneurship fields to elucidate how new firms ease operational and capability constraints by relying on suppliers. We build on TCT and RBV to show how new firms operating in the knowledge-intensive industries address the liabilities of newness, smallness, and unconnectedness by employing outsourcing as a strategic device. A new firm's primary aspiration is to secure commercial breakthrough. Our results follow much in the spirit of Song and Di Benedetto (2008) who highlight the importance of involving suppliers to accelerate new product development in knowledge-intensive industries. To realize this objective, new venture leaders must manage the tension between relying on outsourcing to meet their need for resources and potentially damaging exchange hazards. We point out that when seeking operational knowledge, cost efficiencies, and legitimacy while operating in knowledge-intensive industries, new firms are likely to face the predicament of selecting reputable suppliers operating at the center versus periphery of the network. There are several reasons why they may have no choice but to select the less-

embedded suppliers. Highly-embedded reputable suppliers may not be willing to work with new firms or may be too expensive. New firms may reduce costs by choosing less-embedded suppliers and convincing them to make relationship-specific investments which highly-embedded suppliers may either be not willing to make or make it at a cost not affordable to new firms. While working with less-embedded suppliers, new firms must be willing to compromise on access to superior operational knowledge or quickly building external legitimacy to send market signals.

Second, we identify the unique dimensions of outsourcing capabilities that pertain to new firms. Prior research highlighted the importance of alliance capability in the context of large firms and how such firms can deliberately build such capability by having a dedicated alliance function (Hoang and Rothaermel, 2005) and developing skills that constitute such capability (Schreiner et al., 2009). However, due to liabilities of newness, new firms may not be able to form medium to long-term interdependent contractual arrangements where supplier involvement and resources are central to commercial success. Researchers have emphasized the role of technical (Ethiraj et al., 2005; Lampel, 2001) and relational or contractual capabilities (e.g. Katila et al., 2008) for new firms in reducing the exchange hazards. Overall, our study reveals the additional importance of evaluation, entrepreneurial, and integrative operational competencies for new firms aiming to unlock the benefits from outsourcing.

Third, of particular importance is the finding about the role of legitimizing forces in driving outsourcing. Significantly, the present study indicates that legitimacy is both an enabling and a constraining factor for new firms- enabling because new firms can use reputable suppliers to springboard their odds of securing commercial success by gaining trust position and resources within the network, and constraining because reputable suppliers may only be willing to work with new firms on unfavorable arrangements, and push them towards less reputable suppliers.

6.3. Implications for Practitioners

As recent analyst reports predict outsourcing in biotechnology to continue to grow rapidly (Jefferies & Company, 2009), our findings provide fresh insights into how new firms in dynamic technology-driven markets use outsourcing to overcome resource constraints and build efficient operations. We show that managers in new firms are likely to be attracted towards constructing a web of outsourcing arrangements to secure multiple benefits from supplier networks and ultimately improve resource endowments. A key implication of our study for managers in new firms is that interorganizational relationships may help the firm benefit from supplier operational knowledge and cost efficiencies, access supplier networks, and build legitimacy.

There are also challenges for new firms that rely purely on outsourcing arrangements. Since new firms work with multiple suppliers to meet various resource needs, building the outsourcing capability is crucial, in the absence of which new firms can experience congestion and stress as the entrepreneur involved must simultaneously juggle a large number of outsourcing events and relationships. Managers should be aware of several mitigation strategies. First, defense mechanisms such as patents can help manage supplier misappropriation, particularly of value-added core activities. Second, as the venture evolves, overseeing the volume of outsourcing events and relationships may require organization alignment. This may further necessitate the requirement of integrative outsourcing competencies. This is because such a structure usually combines a ‘program office’ type hub with a delegated line to individuals or units that are engaged in the actual negotiation of outsourcing. New firms do not have the resources or capacity to create a dedicated program office. A scaled-down version of the program office in many new firms is likely to be staffed by the entrepreneurs themselves. This would require entrepreneurs to embody best practices and advance their outsourcing capability to handle routine and non-routine tasks. For instance

entrepreneurs need to not only understand task interdependencies to create a strategic fit, but also to use the right communication channels given the nature of a particular type of innovation task.

In parallel, our research offers some implications for policy. New ventures drive economic growth (Audretsch, 2009) and biotechnology firms play an especially important role in developing local and regional communities (*Economist*, 2009). Government leaders and other authorities can help to foster relationships across local firms, especially given the increasingly global supplier market. Our findings suggest that these policymakers should work actively to build these networks. Furthermore, training for biotechnology entrepreneurs should be directed at building technical, evaluation, relational, entrepreneurial, and integration competencies.

6.4. Limitations and Future Research

While four or more carefully selected cases can be analytically generalized (Eisenhardt, 1989), our case selection is subject to certain potential biases. First, as with all case studies, findings may not be statistically generalizable to the whole population (Yin, 2009). Second, the sample has a success bias as we include only firms that achieved registration and not those firms in the nascent phase, or tried but failed or were sold. A third limitation is the response bias of only those individuals who were interested in participating in the research. Finally, the data are all biotechnology firms and may not be generalizable to other industries. Taken together, these biases prevent us from observing the full range of values on outcome variables; however the methodology is suitable for our purpose of examining new biotechnology firms' outsourcing decisions and processes.

Going forward, our study suggests several directions for future research. Researchers could examine the construct of outsourcing capability and the implications for new firms in highly knowledge-intensive industries in various ways. For instance, researchers could

develop measures for each of the five competencies and examine the relationship between each competence and the various stages of the supplier relationship. This could validate which competencies are central for new firms prior to forming outsourcing relationships and which ones are needed subsequently to carry out effective operations. As a new firm moves through different phases of its lifecycle, the direction a new firm could take to develop each competence could also change. Researchers could also examine the relationship of each competence to various types of activities a new firm is outsourcing. Taking the competency evaluation a step further, researchers could explore the connection between competencies and various objective measures of performance at operational and firm levels, perhaps examining more or less successful start-ups using large-scale data.

Beyond the competencies perspective, further work could investigate outsourcing by new firms in other industries, longitudinal differences in organizational forms, and the role of legitimizing strategies. Given the growing availability of outsource suppliers around the world, especially from emerging economies, future research could examine the geographic – and in some cases offshored- component of outsourcing. Scholars investigating such offshore outsourcing could build on the RBV perspective as well as traditional comparative advantage, product life cycle, and eclectic paradigm theories. The suggested research directions could be investigated using multiple methodologies.