TEAM DESIGN AND PERFORMANCE: A STUDY OF SHORT-TERM ENTREPRENEURIAL TEAMS

by

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Submitted to the Alfred P. Sloan School of Management
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ABSTRACT

In this dissertation, I study the factors that influence the performance of short-term teams engaged in an entrepreneurial activity. This is an important area to study because team-started businesses account for a disproportionately greater number of high-growth firms (Kamm, Shuman and Seeger, 1990). Unfortunately, there has been limited research on team started businesses. The entrepreneurial teams that I study are participants in the MIT $50K Business Plan Competition. This sample is chosen because business plan competitions are increasingly becoming the meeting place for new ideas, people interested in starting business ventures and others who are interested in participating in these ventures (e.g., patent attorneys, investors and venture capitalists). In addition, the sample overcomes some problems typical of many entrepreneurship studies including left censoring biases, population identification and low response rates. Chapter 1 is an overview of the thesis while chapter 2 describes the entrepreneurial activities at MIT. Chapter 3 describes the MIT $50K Business Plan Competition and elaborates the steps taken to collect information from competition participants.

Since entrepreneurial team performance is influenced by factors both internal and external to the team, this thesis takes a comprehensive approach, presenting three papers that explore the effects of team composition, team design and external contacts on entrepreneurial team performance. Both external and team-member evaluations of entrepreneurial team performance are used. Both evaluations are important because positive external evaluations can increase the venture's chances of getting resources (e.g., Roberts, 1991a) while positive internal evaluations can increase the chance that members will be satisfied with their teams and continue in team involvement (e.g., Hackman, 1987).

The first paper, described in chapter 4, explores the influence of team design, both team structure and member interaction, on short-term entrepreneurial team performance. The findings show that there are different drivers of performance. While task design predicts external evaluations of performance, the way in which members interact predicts member-rated performance.

The second paper, described in chapter 5, explores the influence of team-member functional diversity on short-term entrepreneurial team performance, with team design as the mediating variable. This study shows the need to investigate the indirect effects of functional diversity on performance and to distinguish between external and team-member evaluations. The results show that functional diversity has negative indirect effect on member-rated performance but no effect on external-rated performance.

The third paper, described in chapter 6, explores the influence of member contacts with people outside the team on short-term entrepreneurial team performance. The study shows that high-performing teams gather a range of information and are efficient in information gathering. The study shows that social capital concepts, such as strong and weak ties, can be integrated with the team literature.

The concluding chapter proposes a model that combines the influence of internal and external factors on entrepreneurial team performance. The chapter also summarizes the findings and compares them to the new venture and team literatures. Finally, areas for future research are proposed.

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CHAPTER 1

OVERVIEW OF THE DISSERTATION

There is increasing interest in entrepreneurship as a field of study for both academics (e.g., Shane and Venkataraman, forthcoming) and students (e.g., Roberts, 1991a). Shane and Venkataraman (forthcoming) provide three reasons to study entrepreneurship. First, entrepreneurship is the primary mechanism through which technical knowledge is converted into products and services. Second, entrepreneurship is a significant mechanism through which inefficiencies in the economy are discovered and mitigated. Third, through the above factors, entrepreneurially led innovation is an important engine that drives change in society.

Although the study of entrepreneurship is essential, most studies have focused on the individual founder instead of the founding team (Cooper and Daily, 1996). Consequently, the founding team has remained very much a black box and the limited research in this area is mostly anecdotal, lacking a theoretical base (Cooper and Daily, 1996). This is surprising because team-started ventures account for a disproportionately greater number of fastest-growing firms (Kamm, Shuman and Seeger, 1990) and have greater chances of success than firms started by individuals (Chandler, 1998). For example, Kamm et al. (1990) found that of 33 successful high-technology companies, 23 were founded by teams. The authors concluded that the benefits of team-founded ventures cut across different industries, geographic locations and gender. Similarly, Roberts (1991a) discovered that 14 percent of multiple-founder ventures from MIT laboratories were the highest performing compared to only three percent of individual-founded ventures. Further, Roberts (1991a:258) reported that performance of business ventures started by

teams was superior to that of single-founder companies, regardless of how performance was measured. He notes that the number of original company founders is one of the strongest and most consistent correlates of later success and this is shown repeatedly in almost all of his studies over a 25-year period. Despite these significant findings, the founding team has been neglected by researchers. Most studies focus almost exclusively on individual entrepreneurs resulting in weak predictions of new venture performance (Chandler and Hanks, 1998). Chandler and Hanks (1998) argue that stronger links to performance might be revealed by enlarging the scope to include the characteristics of the founding team.

This dissertation explores the factors that influence the performance of short-term teams in the early stage of an entrepreneurial activity because early experiences shape future routines (e.g., Stinchcombe, 1965; Burton, 1995:13), culture (e.g., Schein, 1983) and performance (e.g., Eisenhardt and Schoonhoven, 1990). Unlike most studies, I focus on the founding team rather than on the lead founder (e.g., Schein, 1983) because research shows that it is the members' combined characteristics that influence performance (e.g., Smith et al., 1994).

This thesis is an exploratory study on short-term entrepreneurial teams and makes the following contributions. First, it expands the thin body of extant literature on entrepreneurial teams (e.g., Cooper and Daily, 1996) and contributes to the knowledge base of both academics and practitioners by examining factors that influence the success of venture teams. Second, by focusing on the effects of both internal team make-up and external activities on performance this study shows how and why both team characteristics and contacts with others are important. Third, the dissertation shows that the drivers of external and team-member evaluations of short-term entrepreneurial team performance are different. For a team to be effective, both drivers of performance need to be managed (e.g., Hackman, 1987).

Chapter 2 describes the entrepreneurial activities in MIT and shows how these activities contributed to the growth of high-technology start-ups in the Route 128 region (a ring road around the Boston/Cambridge Metropolitan area). Following that, chapter 3 describes the MIT $50K Business Plan Competition and how data was collected from the competition participants during different phases—the business idea and business plan—of the competition. This competition is one manifestation of the University's entrepreneurial spirit and is a suitable sample for an exploratory study of entrepreneurial teams because the competition and the events surrounding it have become a focal point where ideas, financiers (such as venture capitalists or business angels) and supporting infrastructure (such as consultants or lawyers specializing in assisting start-ups) intersect (e.g., Ballon, 1998a). In addition, a sample drawn from a business plan competition overcomes some problems of other entrepreneurial team studies including left censoring biases, population identification and low response rates. Among business plan competitions, the MIT $50K Competition is one of the most successful in terms of spinning off new ventures (Ballon, 1998b). Since 1996, 20[1] teams that participated in the MIT business plan competitions have started new ventures compared with 15 such teams from the University of Texas at Austin, 12 from Harvard University, 11 from the University of Arizona and six from the University of Oregon (Ballon, 1998b). Throughout the dissertation, I refer to such short-term groups as entrepreneurial teams[2]. They are entrepreneurial as defined by the activity they are engaged in, which is the preparation of a business plan although I do not assume that they are entrepreneurial in the sense of being good at networking, getting resources or coming up with products and services that will be accepted by the market.

[1] 30 companies from 1990 (MIT entry kit, 1998).

[2] For this thesis, unless stated otherwise, entrepreneurial teams and short-term entrepreneurial teams are used interchangeably.

The remaining chapters explore different factors influencing entrepreneurial team performance in the early start-up phase. Three papers separately explore the internal and external factors on performance but as a collection, they offer a better understanding concerning the ways in which entrepreneurial teams can be high-performing. Many studies (e.g., Hackman, 1987) have focused on the internal design of the team including task allocation and how members go about performing these tasks (e.g., West and Anderson, 1996). Other investigators have focused on diversity issues (e.g., Pfeffer, 1983) and some researchers (e.g., Ancona and Caldwell, 1992a) have found that it is a team's external ties that account for team performance. Because there are relatively few studies on entrepreneurial teams (e.g., Cooper and Daily, 1996), I elected to study all three areas to determine whether or not, and if so, how, these factors influence performance.

The first paper, described in chapter 4, explores the influence of team design, both team structure and member interaction, on performance. The findings show that there are different drivers of entrepreneurial team performance. While task design predicts external evaluations of performance, the way in which members interact predicts member-rated performance.

The second paper, described in chapter 5, explores the influence of team-member functional diversity on entrepreneurial team performance, with team design as the mediating variable. This study shows the need to investigate the indirect effects of functional diversity on entrepreneurial team performance and to distinguish between external and team-member evaluations. The results show that functional diversity has negative indirect effect on member-rated performance but no effect on external-rated performance.

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CHAPTER 2

MIT's ROLE IN PROMOTING ENTREPRENEURSHIP

Overview

This chapter describes the role of MIT in promoting entrepreneurship and included in this thesis because the sample used in the thesis, i.e., teams participating in the MIT $50K Business Plan Competition, represents part of the overall University's focus on entrepreneurship. The chapter first presents the impact of entrepreneurial activities at MIT and relates two success stories that illustrate entrepreneurial leadership. I then describe how MIT's involvement with industry and the government promoted entrepreneurship in the Boston region. I also explore whether MIT's capability to encourage the growth of entrepreneurship is unique, or whether other universities can replicate this success. Finally, I describe how entrepreneurship has become a legitimate area of study, with a corresponding increase in the prestige of professors teaching in this area (Kotter, 1995).

MIT Background

Since the University's founding in 1861, MIT encouraged entrepreneurship (*The Economist*, 1987) and for a long time, MIT stood virtually alone as a university that encouraged rather than shunned industry (*The Economist*, 1995). Its motto of *Mens et Manus*, which translates from Latin to "Minds and Hands," reflects the ideals of the founders who advocated education with a practical focus. Early programs included placing student interns in factories, a practice that is widespread today (Rosegrant & Lampe, 1992:18). The university also developed close ties with

industrialists, including Thomas Edison, Alexander Graham Bell and alumnus Alfred P. Sloan (Roberts, 1991a:33).

In the 1930s, when Karl Compton, then MIT President instituted the regulation that faculty could spend 20 percent of their time on consulting projects, the purpose was to limit rather than to promote nonacademic activities (Rosegrant & Lampe, 1992:18). Faculty members were allowed to do part-time consulting and to start their own companies (Rosegrant & Lampe, 1992:18). Research staff and employees were also allowed to form companies and consequently almost half of all MIT spin-off companies, and most faculty-started companies, were started on a part-time basis. In this way, the faculty members and researchers could evaluate whether their ideas could be developed into a viable business before attempting to devote more attention to their businesses. A large number of faculty members, including Amar Bose, the founder of Bose sound systems, continued to teach and do research at MIT. Few faculty actually resigned, instead turning control of daily business operations over to their partners, many of whom were their former graduate students (Roberts, 1991a:34).

Impact of entrepreneurial activities at MIT

BankBoston (1997) studied the impact of business formation by MIT alumni and discovered that if MIT alumni-founded companies were an independent nation, they would form the world's 24th largest economy in terms of revenue. In 1997, business ventures of the alumni accounted for annual sales of $232 billion and employment of 1.1 million people. The bank report also gives other impressive facts: inventions by MIT faculty, researchers and students add about $20 billion and 150,000 jobs to the U.S. economy every year. MIT alumni start about 150 companies

annually—a large number considering that annual enrollment is about 2,400 students, with approximately equal numbers of graduate and undergraduate students. Given MIT's focus on engineering, high-technology and research, many of these firms gravitated towards knowledge-based industries. They included software, higher technology manufacturing and consulting work. Compared to the national average, MIT-related companies are more likely to sell outside of the states where they are founded and to produce cutting-edge, high-technology products (Roberts, 1991a:355). MIT is the number one university in terms of patents granted annually, and it signs about 70 license agreements with private companies annually.

The most successful MIT-related start-up is the Digital Equipment Corporation (DEC) that was founded in 1957 by Kenneth Olson and Harlan Anderson, with $70,000 venture funding provided by the American Research and Development Corporation (AR&D) (Rosegrant & Lampe, 1992:4). Olson joined the Whirlwind Project, a team of MIT-based researchers headed by Jay Forrester, which developed the first electronic computer. Olson and Anderson aimed to develop a company that would design and build machines that reflected the Whirlwind/TX-2 real-time interactive approach, in contrast to the large number-crunching data processing computers that IBM and Univac already had on the market (Roberts, 1991a:6). Another legendary MIT spin-off is Raytheon, a firm that was started in 1925 by Vannevar Bush, an MIT faculty member in the Electrical Engineering department who later served as the vice-president of MIT. Bush also helped found the American Appliance Company, the precursor of the Raytheon Manufacturing Company (Saxenian, 1994:13). MIT and Raytheon researchers collaborated closely, often working side by side on projects which included work on ultra-high radio frequencies and dielectrics to aircraft guidance and detection systems. Today, the company has close contacts with MIT faculty and researchers (Rosegrant & Lampe, 1992:68).

While the BankBoston study and the stories of DEC and Raytheon illustrate the entrepreneurial spirit of people linked to MIT, this spirit is also institutionalized in the programs in MIT to promote entrepreneurship. For example, one reason for MIT's capabilities in commercializing its technology is the MIT Technology Licensing Office (TLO) that helps faculty and researchers patent their inventions. The TLO also licenses these technologies in exchange for royalties. In 1988, John Preston, then director of the TLO, further encouraged the commercialization of MIT-developed technology by accepting founder stock in exchange for licensing MIT's technology. This was a bold step beyond the royalty agreements that were standard at the time (Roberts, 1991a:43). There are also extensive connections between MIT and industry, and MIT and government. In the next section, I describe some of these connections which contributed to the development of high-technology industries in the Route 128 region.

MIT's involvement with industry

MIT has a long history of involving industry in its academic and research programs. In 1918, MIT started the technology plan (Roberts, 1991a:33) which encouraged large companies such as GE and Dupont to provide financial support for the University's projects. In exchange, the companies received assistance from faculty and other researchers in keeping up to date with the latest technological developments. Based on the technology plan, the Industrial Liaison Program was established in 1948. The program coordinators organized conferences on developments in science, technology and management practices and also helped set up individual meetings among leaders in industry and academia (Saxenian, 1991:13, Rosegrant & Lampe, 1992:60). Today, this program is the largest university-industry collaboration (Roberts,

1991a:33) and perhaps its size is not surprising, considering the seven industry giants in its beginnings: Standard Oil of New Jersey, Humble Oil, Standard Oil, the Texas Company (Texaco), Socony-Vacuum, Stone and Webster, and A.O. Smith Corporation.

In addition to creating joint industry and faculty programs in research, MIT was also instrumental in developing the venture capital industry. In fact, the venture capital firms that we know today started with the 1946 founding of the American Research and Development Corporation (AR&D), based in Boston (Rosegrant & Lampe, 1992). Karl Compton, a former MIT president, headed the defense laboratories in Washington, D.C., during World War II. After the war, he began efforts to commercialize the technologies that had been developed by these defense-related laboratories. Together with Merrill Griswold, then chairman of the Massachusetts Investors Trust, and Ralph Flanders, then president of the Federal Reserve Bank of Boston, they organized the AR&D to supply capital to New England entrepreneurs. Compton became a board member; the MIT department heads of Chemical Engineering and Aeronautical Engineering acted as advisors; and MIT's treasurer served as AR&D's treasurer. In total, more than 1,200 organizations and high net-worth individuals invested in AR&D whose mission was not only to turn in high returns for the investors, but also to stimulate the creation of new companies in New England and to commercialize new ideas and technologies (Roberts, 1991a:33, Rosegrant & Lampe, 1992:111). Georges Doriot, professor of Industrial Management at Harvard University, was the first president of AR&D and also served as mentor to these companies, giving management and strategic advice—a practice that is common with venture capital firms today (Roberts, 1991a:33, Rosegrant & Lampe, 1992:111). AR&D invested mainly in ideas promoted by MIT faculty and assisted the ventures in various ways, including housing them in MIT buildings (Roberts, 1991a:134).

AR&D was the incubator for many other venture capital companies, providing the skills, experience and networks that led AR&D alumni to establish their own venture capital firms (Roberts, 1991a:134). The success of AR&D-funded companies also spurred New England's financial institutions, including the banks and insurance companies, to invest in start-ups. For example, the First National Bank of Boston served as an intermediary between nascent entrepreneurs and wealthy families. The bank also formed an investment company to lend money to early-stage firms, based on receivables from government research and development contracts, a very risky move at that time. In 1958, the bank became the first Small Business Investment Corporation (SBIC) (Saxenian, 1994:15; Roberts, 1991a:36).

MIT's involvement with the government

In addition to working jointly on programs with industry, MIT collaborates with the government, especially the Department of Defense, on high-technology research (Roberts, 1991a). The government sponsored many of the laboratories during World War II. Today, MIT has an annual research budget of about $800 million—larger than any other university in the United States, and a large portion of the money is secured through the Department of Defense contracts. In 1990 for example, MIT received $455 million in defense contracts, more than any other nonprofit organization. This collaboration in turned facilitated the growth of high-technology products and industries, through the commercialization of the technologies developed by MIT faculty and researchers (Rosegrant & Lampe, 1992:15).

The entrepreneurial activities of MIT alumni, and the university's involvement with industry and government, contributed significantly to the development of the Route 128 region.

According to Rosengrant and Lampe (1992), more than any other school, MIT is closely tied to the creation and growth of the Boston area's new-technology community. They argue that any study of the Route 128 phenomenon "becomes by necessity an examination of the policies at MIT that have made it such a fertile source of ideas, entrepreneurs, and innovative relationships with industry and government" (Rosegrant & Lampe, 1992:14). Route 128 is a symbol of one of the world's leading centers of innovation and is "a region where, on a grand scale, a broad array of emerging technologies has been developed and gotten its first taste of the marketplace. This is an unpredictable process that is not always dramatic, not always financially rewarding, and not always successful, but it is crucial to the productivity and competitiveness of the nation" (Rosegrant & Lampe, 1992:13).

Can other universities replicate MIT's success in developing high-technology industries?

It is still an open question whether or not other universities that aspire to encourage high-technology entrepreneurship, such as Cambridge University in England, could be as successful as MIT has been. For example, Rosegrant & Lampe (1992) argue that the success of Route 128 is due to the tripartite cooperation and tensions among universities, government and industry. They note that universities, industry and government do not always share the same objectives. Universities need to train individuals to be capable of handling future technologies; companies need to make profits; and the government needs to meet social and economic objectives (Rosegrant & Lampe, 1992). The authors argue that it is the tensions and interplay, rather than the straight commonality in objectives that encourage the development of high-technology industries in the Route 128 region (Rosegrant & Lampe, 1992). Similarly, Roberts (1991)

reasons that the positive feedback loops among this tripartite of academia, industry and government support, were instrumental in the growth of high-technology industries in the Route 128 region. Roberts (1991a) adds that it is uncertain whether the region would have taken off without the huge defense funding and technologies that were developed during World War II and the Cold War that followed. Roberts (1991a:36) also argues that the presence of other universities with strong engineering departments, such as Boston University, Tufts University and Northeastern University, also provides the skilled manpower to staff the high-technology start-ups.

Although it is uncertain whether other universities would be as successful as MIT in promoting high-technology entrepreneurship, there is evidence that these universities can contribute to the growth of high-technology industries in their own regions. The most notable example is the Silicon Valley area (i.e., around Palo Alto, in California), in which two world-class universities, namely Stanford University and the University of California at Berkeley, contribute to the growth of high-technology firms in the region. Silicon Valley also has the support of venture capital firms and large defense contracts that fund universities in the region (Herbig and Golden, 1993). However, even in Silicon Valley, the rate of university-based start-ups is lower than that at MIT. For example, Cooper (1971) found that only eight out of 243 technology companies in Silicon Valley have their roots in Stanford. MIT alumni, on the other hand, account for 21 percent of the manufacturing employment in Palo Alto (Roberts, 1991a:351). In other regions, Roberts (1991:351) reports that North Carolina's Research Triangle Park shows few ties between university spin-offs and the region's major universities. In Austin, Texas, Roberts (1991:351) found that only 23 firms were University of Texas at Austin spin-offs

and Feeser and Willard (1988) found only one university spin-off in their nation wide sample of 108 computer-related start-ups.

Overall, these studies support the "cluster effects" summarized by Porter (1998) that the concentration of similar types of industries supported by cluster-specific assets and infrastructure such as university and other training centers, can encourage entrepreneurial activity. Cooper (1986) also note that access to venture capital, availability of support personnel and services, access to customers, and favorable economic conditions can help develop a region's entrepreneurial environment. However, the evidence also suggests that MIT is more successful than other universities in commercializing its technology. Roberts (1991a) concludes that the "MIT-Route 128 model still today remains unusual in its degree of regional entrepreneurial dependence upon one major academic institution. Perhaps other regions need other 'models' if they are to achieve technology-based industrial growth."

Entrepreneurship as an area of study

The earlier parts of this chapter describe the entrepreneurial climate and activities at MIT emphasizing how they have spurned the growth of high-technology industries in the Route 128 region. This discussion leads to the next topic, which is entrepreneurship as a legitimate area of study. The development of this discipline is important because it gives students the skills to start businesses and legitimizes working for start-ups after graduation. At Stanford, for example, 28 percent of the graduating class of 1998 work in small firms or run their own companies (Business Week, 1998). Entrepreneurship as a distinct discipline is a recent development. In 1970, only 16 business schools offered classes in entrepreneurship. Today, over 500 universities

in the United States offer such classes, with 100 schools offering a specialty in the field (Business Week, 1998). In Harvard Business School for example, only two out of 42 elective courses in 1973 focused on small businesses and almost none of the Harvard faculty wanted to teach them. They were not a business school specialty with any prestige and adjunct and visiting professors were usually recruited to teach them (Kotter, 1995:29). But today, about 25 percent of the student body specialize in the entrepreneurship area (Kotter, 1995). Roberts (1991a) notes that the growth in student interest and enrollment in entrepreneurship classes and majors is a national occurrence, manifested "by the outbreak of national academic society meetings devoted to the same topic. Awards for papers or research on entrepreneurship are suddenly being provided by business and engineering schools across the country, further nourishing the interests and exposure" (Roberts, 1991a). There is also some evidence to suggest that the growth of entrepreneurship as an area of study is occurring outside the United States. For example, in 1998, Cambridge University in England announced that it was implementing a US-style school of entrepreneurship (Financial Times, 1998) and in Asia, the National University of Singapore will be offering entrepreneurship as a major area of study for the first time in 1999.

Given the focus of MIT in promoting entrepreneurship since its founding in 1861 and the increasing interest of students in entrepreneurship, this thesis looks at one particular sample within MIT that is a relatively new addition to the entrepreneurial spirit in the University—the MIT $50K Business Plan Competition. The next chapter gives describes the competition and the types of data collected from competition participants.

CHAPTER 3

BACKGROUND OF THE MIT $50K ENTREPRENEURSHIP COMPETITION AND DATA COLLECTION

This chapter describes the MIT $50K Entrepreneurship Competition (referred to here as the MIT $50K Competition or the MIT $50K) and the types of and timeline that information was collected from the competition participants. The competition is central to this study because some of its participants agreed to take part in my research, forming the sample group of team members under discussion here. The chapter explains why it is useful to study a business plan competition within MIT giving a brief history of the competition, together with its stages and judging process, and the set of activities that its organizers use to assist team participants. Before describing the competition itself, the chapter describes the entrepreneurial team context. Understanding of which is necessary because context often moderates the effects of various factors on team performance (e.g., Jehn, 1995).

CONTEXT

To understand the various factors that influence the performance of entrepreneurial teams, it is first necessary to understand the context of such teams. Entrepreneurial teams differ

from the types of work teams typically studied in the academic literature, and we must expect that there would be different theoretical explanations of behavior for different types of teams. First, entrepreneurial teams are founded instead of concocted teams. According to McGrath, Arrow and Berdahl (forthcoming), in founded teams, members select the people with whom they want to form a team. On the other hand, in concocted teams (e.g., project development teams), external parties, such as management, play a central role in the group's formation. One characteristic of a founded team is that people tend to select members who are similar to themselves (e.g., Westphal and Zajac, 1995) leading to tightly held teams (e.g., O'Reilly et al., 1989). Thus, while holding—defined by Louis and Yan (1996) as the extent members share similar identities, sense of purpose and know who is and is not a team member—is expected to have a curvilinear effect on work team performance[1], entrepreneurial teams with higher holding are expected to have lower performance than teams with lower holding. Another possible consequence of self-selection is that these teams tend to be small since teams that are too large tend to break up (e.g., Calsyn and Becker, 1976). Consequently, while size is expected to have a curvilinear effect on the performance of work teams (e.g., Cohen and Bailey, 1997) (teams that are too small lack sufficient resources to be effective and teams that are too large experience process losses) larger entrepreneurial teams are expected to have better performance than smaller ones.

A second context facing entrepreneurial teams is that they are engaged in innovative

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[1] Teams with too little holding, are not efficient (e.g., Louis and Yan, 1996), while teams with too much holding are closed to outside sources of information (e.g., Louis and Yan, 1996).

activities. Shane and Venkataraman (forthcoming) argue that the entrepreneurial act requires the possession of private information about an opportunity. They explain that this opportunity must not be evident to everyone all of the time and that for any given opportunity, only a subset of the population will identify it. Similarly, Kirzner (1997) argues that through information asymmetry, unthought-of-possibilities are discovered and form the basis for entrepreneurial opportunities. And my expectation in this study is that teams that are better able to get information, either from within the team or from contacts outside the team, will perform better than teams that are less adept at information gathering.

Third, because young firms often lack a track record entrepreneurial teams lack the support of people outside the team (e.g., Stinchcombe, 1965) which leads to higher failure rates of such firms (Stinchcombe, 1965). To be successful, entrepreneurial teams need to take steps to gain the approval of people outside the team but because they are resource-constrained (e.g., Stinchcombe, 1965), they also need to be efficient in their operations. The lack of external support and adequate resources are less severe in other work teams, such as product development teams, because the teams' organizations often support and provide resources to them (e.g., Arrow and McGrath, forthcoming).

Thus entrepreneurial teams are in an interesting setting to explore the scope conditions of what is known from our research on teams. In addition, as compared to other types of teams, both laboratory and work teams, the stakes can be higher because the failure of these teams could mean the loss not only of time and effort but also the financial resources that these potential entrepreneurs put in their teams. The remaining sections of this chapter describe the MIT $50K

Competition because the teams in this competition are engaged in a short-term entrepreneurial task to determine the factors influencing these teams' performance.

WHY TEAMS IN A BUSINESS PLAN COMPETITION FORM A SUITABLE SAMPLE

While it is important to study team-based entrepreneurial ventures, such an endeavor is fraught with difficulties. This section discusses some of these problems and show how a study of teams in a business plan competition can overcome some of these problems. Morever, there are several characteristics of a business plan competition that makes it similar to "real world" entrepreneurial teams. Finally, the section discusses several advantages of such a competition over laboratory-based team studies.

There are several problems with studying "real" entrepreneurial teams. First, it is difficult to identify a sampling frame from the population of entrepreneurial teams because these teams are identified only after they have successfully formed new ventures and less successful teams are likely to be omitted from the sample, leading to selection biases (Shane, 1998). In addition, it is important to study entrepreneurial teams from the early start-up phase because origin conditions become imprinted on firms (formed by these team members) that influence how these firms develop (Stinchcombe, 1965; Hannan and Freeman 1977) and limiting the scope of future changes (Hannan, Burton and Baron, 1995). Second, it is hard to locate a sample to have comparable performance measures across teams because there are significant differences in start-

up activities (Carter, Gartner and Reynolds, 1996). Thus, even if a population of entrepreneurial team is identified, it would be difficult to select a performance measure that could consistently be applied to this population. Third as noted above, entrepreneurial teams face resource constraints and it would be difficult to get them to participate in the study and to provide detailed information about the backgrounds of team members, team characterisitics and the teams' business ideas. For example, Amit (1994) had a response rate of 24 percent in a study of factors that led individuals to become entrepreneurs. This low response rate is to my knowledge typical of other entrepreneurship studies and consequently, it is uncertain the extent to which these studies represent the views of the population that they are drawn from.

There are several ways a business plan competition can overcome the above limitations. In a business plan competition, the population of entrepreneurial teams is well defined since all teams, whether they are successful or not, must submit their business plans. Furthermore, all the teams are in the early start-up phase, a phase that has been shown in past research (e.g., Hannan and Freeman, 1977) to determine how a venture progresses. Second, in a competition, a consistent performance measure (based on a rating sheet that the judges use) is applied to all the teams. Third, detailed information of the teams can be gathered since the teams must submit extensive team information, including the resumes of all participants and copies of their business plans to the organizers. Since the population is small and well-defined, extensive efforts can be taken to get a high response rate. For these reasons, I use a sample of teams that participate in a business plan competition in an exploratory study of early-stage new venture team performance.

In addition to overcoming some limitations of "real world" samples, a business plan competition also resembles "real world" samples in three ways. First, business plan competitions have increasingly become incubators for new companies (Ballon, 1998b). Currently, in universities in the United States, there are about 50 business plan competitions (Ballon, 1998b). Of these, the MIT $50K Competition is especially important because it is the most successful in terms of spinning off new businesses (Ballon, 1998b).

Second, many students do start companies, such as Michael Dell who founded Dell computers in the early 1980s when he was an undergraduate student in the University of Texas. While in college, he assembled and sold computers from materials and components bought from manufacturers' excess stock (*Business Week*, March 22, 1993). Another example is Bill Gates, who developed and sold his computer system's software, written in BASIC, while he was an undergraduate student in Harvard University (Gates, 1995). Although these are two extreme examples of successful student-entrepreneurs, they are good illustrations of the type of entrepreneurial activities that students are involved in. Unfortunately, few studies to my knowledge have researched student-based entrepreneurial activities and instead have focused on spin-offs from research laboratories (e.g., Roberts, 1991a).

Third, a business plan competition (at least the MIT $50K Business Plan Competition) sample compares well to those used in other studies of entrepreneurs in high-technology fields. The main comparison will be with Roberts's (1991a) studies, because he, too, focused on high-technology start-ups. As shown in Table 3.1, my sample and that used by Roberts' (1991a) are made up of participants with relatively similar educational levels. Roberts (1991a) reported that

63 percent of the participants in his sample had at least Master of Science degrees. In the sample for this dissertation, 58 percent of the participants had (or were pursuing) Master or Ph.D. degrees. Similarly, every participant in both Roberts's (1991a) study and this dissertation were at least high school graduates. The samples also have small team sizes. The median founding team size for Roberts's (1991a) study was two members. The average team size for the participants of the MIT $50K Competition was 3.9, with a median of four. Roberts (1991a) reported twice as many male participants than female, while in the MIT $50K Competition, 85 percent of the participants were men and 15 percent were women. Most of the entrepreneurs were young; Roberts (1991a) reported a median founder age of about 32 while Smilor, Gibson and Kzmetsky (1989) found that the entrepreneurs from the University of Texas-Austin spin-offs had an average age of 34 years when they started their business ventures. Similarly, Utterback (1988), in a study of 60 Swedish entrepreneurs, found a median age of 34. The participants in this study were also young, on average, even younger than the subjects in the studies reviewed and two possible reasons may explain the age difference. First, there is some evidence to suggest that today, people of a younger age are starting new ventures. For example, Lewis (1999) reported that an increasing number of students, even those who are still in high school are starting business ventures. Another reason for the age difference between the participants in this study and the studies reviewed is that the participants in this study are attempting to start business ventures while the subjects in other studies had already started their businesses.

INSERT TABLE 3.1 HERE

In addition to the suitability of studying teams participating in a business plan competition, a sample based on these teams has several advantages over laboratory-based team studies. First, the reward for successfully doing their task—a $30,000 prize award, pro bono assistance and publicity—is greater than that which most laboratory studies can provide. Second, the participants are involved in a task that requires about 200 man-hours to complete (Olive, 1996). In contrast, many laboratory-based studies are completed in a few hours or in a day. Third, teams in a business plan competition are engaged in a cognitive task that is more complex than many laboratory-based studies. Preparing a business plan requires the team to build a business model that involves the development of the marketing, financial and technological portions of the plan and to integrate these diverse parts together (Olive, 1996). Many laboratory studies focus on less complex tasks, such as the Winter Survival Exercise by Volkema and Ronald (1998).

Overall, the combination of the potential to identify a population of teams with members that are interested in an entrepreneurial activity, the potential to have a high response rate with detailed information from team members as well as a setting that resembles that of "real" entrepreneurial teams makes this a suitable sample to study factors influencing early stage entrepreneurial team performance. The remaining parts of this chapter describe the competition and steps taken to collect data from competition participants.

DESCRIPTION OF THE MIT $50K COMPETITION

Overview

In the previous section, I described the context in which entrepreneurial teams are situated and the suitability of this sample for an exploratory study of factors influencing entrepreneurial team performance. In the remainder of this chapter, I describe the MIT $50K Competition itself, based upon information gathered from its organizers and from my own participation in the meetings, judging sessions and events.

Background of MIT $50K competition

The MIT $50K Competition was started in 1990 by a group of students from the MIT Entrepreneurs Club and the MIT Sloan New Venture Association. The competition is "designed to encourage students and researchers in the MIT community to act on their energy, ideas, and talent to create tomorrow's leading firms" (MIT $50K entry kit, 1998). From 1990 to 1997, the competition has contributed to the establishment of over 30 companies, with an estimated market capitalization of $180 million dollars (MIT $50K entry kit, 1998).

While the business plans are the immediate outputs of the competition, the goal of the competition is to assist teams in building tomorrow's leading firms (MIT $50K entry kit, 1998). To achieve this goal, the competition organizers provide a range of resources for team-building, mentorship, education and networking. These activities help teams form and develop required skills, and then help them move from ideas to plans and into businesses (MIT $50K entry kit, 1998). Team-building events come first in order to assist participants in finding team members. There are two major types of team-building events. The first is the networking in informal dinners, that are attended by between 30 and 60 people. These get-togethers are held every other week during the early phases of the competition, and once a month in the later stages. They are attended by participants who want to join a team and by people who are looking for team members. Non-participants with start-up experience are also invited to the dinners for the purpose of networking and providing ad hoc advice. Networking also occurs via the second team-building mechanism which is the MIT $50K Competition website on which participants can list the type of team members they are looking for. Individuals can also list their skills on the site so that inchoate teams can contact them.

The second set of support activity is the educational programs. First, there are talks given by distinguished speakers. For example, in the MIT $1K Competition in November 1997, the lead speaker for the kick-off event was Robert Metcafle, the founder of 3Com, a major network hardware manufacturer. In the 1998 MIT $50K Competition kick-off, the lead speaker was Guy Kawasaki, one of the developers of Apple Macintosh and for the 1998 MIT $50K Competition semi-finals, the lead speaker was Geoffrey Moore, the author of the best-selling book on high-

technology marketing strategies, *Crossing the Chasm*. These talks are designed to encourage potential participants, stimulating their interest in entrepreneurship through the speakers' own experiences. The second type of educational outreach consists of specialized talks and short courses. In the 1998 MIT $50K Competition, for example, a panel discussion was conducted on intellectual property. Short courses (about a week long) were also conducted on preliminary venture analysis, personal entrepreneurial strategy and starting and running a high-technology company. The third type of educational program is consultation sessions. Professional services firms set aside office hours during which their staff will give advice to participants in areas such as finance, law and marketing.

The final type of support activity is the mentorship program. Individuals with start-up experience or those having experience with business plans (such as venture capitalists) are encouraged to participate in the competition as mentors. Mentor-participant relationships help teams focus on important issues and also help them avoid potential pitfalls (MIT $50K entry kit, 1998). While the competition organizers provide the opportunity for mentor involvement with teams, team members must take the initiative to contact mentors. Similarly, mentors have the right to decline to help a team if they do not have interest in a particular team or if they cannot offer expertise in a given area. This flexibility is offered to help facilitate a good match between the needs and interests of both teams and mentors.

Phases of the business plan competition

The MIT $50K Competition consists of two competitions. The first, held in November each year, is called the MIT $1K Warm-Up Business Idea Competition. In this arena, teams submit a business idea (approximately two to five pages long). In November 1997, 120 teams participated in the MIT $1K Competition and 10 winners were selected, with each receiving $100. The MIT $1K serves as a primer to the main competition held three months later—the MIT $50K Business Plan Competition.

The winner of the first business plan competition received $10,000 while the second- and third prize-winners were awarded $3,000 and $2,000 respectively. The first competition attracted 54 entries and in 1997, the competition increased the prize money to $30,000 for the winner and $10,000 each for the two runners up. In addition to prize money, the winners receive pro bono services from professional firms in areas such as accounting, legal and strategic management. To encourage the winners to start companies, half the prize money is distributed when the teams incorporate and the other half is distributed a year later, after one of the competition judges has reviewed the ventures' progress.

Business plan phase of the MIT $50K Competition in 1998

This section describes the business plan phase of the competition in 1998. I focus on the judging process because the judges' ratings are used as a performance measure in this study. The judges have two major functions: to select winners of the competition and to provide feedback to the teams. The judges are selected from the venture community, and include successful entrepreneurs, venture capitalists and providers of legal and financial services (MIT $50K entry kit, 1998). Among the competition judges in 1998 were: Jean Notis-McConarty, Partner in Coopers and Lybrand, J. William Poduska, Founder of Prime Computer and Apollo Computer and Mitch Kapor, the founder of Lotus Development Corporation and Co-founder of Electronic Frontier Foundation. A list of all the 19 judges in the MIT $50K Competition are listed in Appendix 1. Since the specifics of judging vary from year to year, I describe the judging process in the 1998 MIT $50K Competition because the sample is drawn from the entrants in that year.

In the first of the competition's rounds, the judges evaluated 82 entries. They were grouped into four judging cells, three that evaluated plans in the "high-technology" category and one that evaluated plans in the "others" category. Participants chose the category placement for their plans. Each judging cell consisted of four judges (note that this does not match exactly with 19 total judges in the competition because not all the judges were involved in every stage of the competition), each of whom evaluated between 19 and 22 plans. Each judge read all the plans submitted to his or her judging cell and provided written feedback on half of these plans, so that

each plan received written feedback by two judges. The judges also rated the plans in 10 categories (on a scale from one to five, with the higher the better). The categories were: the ability of the team to define the customer, identify who pays for the product or service, show high potential, describe the product or service, analyze the competitors, differentiate from competitors' products or services, protect competitive advantage, balance the team, substantiate claims and quantify the business model. The form that the judges' used to evaluate the teams are shown in Appendix 2. Competition organizers chose these items for evaluation because they corresponded to the written comments of past competition judges. Over one afternoon, the judges met and each cell selected the best eight to nine business plans in their own cells. After all the cells had selected their best plans, all the judges convened and selected 36 teams for the semi-final round.

In the semi-final round, the 36 teams submitted full business plans of approximately 30 to 60 pages each. The judges then met again in the same cell and each cell selected the best two to three plans. Following this session, they convened for a plenary session where they selected six teams for the finals and in the finals phase of the competition, the teams presented their plans before all of the judges. Two teams were selected as first-prize winners and were awarded $30,000 each, while the team that was placed third received $10,000. According to the 1998 lead organizer, the competition is structured much like the real-world funding environment. While a good plan is required to get a foot in the door with potential investors and financiers, those who get their foot in the door still have to make convincing presentations to get funding.

DATA AND METHODS

While the above sections offer insights into the significance of the entrepreneurial teams under scrutiny in this study and how the MIT $50K Competition operates, the remaining sections of this chapter describe the data, mostly quantitative, but with 13 interviews that illustrated team activities, that were collected during the competition. Table 3.2 shows the dates of major events in the MIT $1K and $50K competitions and the actions taken for this research during these events.

INSERT TABLE 3.2 HERE

The lead organizer of the MIT Business Plan Competition was contacted during the summer of 1997 to get her permission to study teams in the competition. She supported the study and gave me full access to the competition including the organizer's meetings, plans submitted by the competition participants, contact information and resumes of the participants, judging sessions and judges' feedback to the teams. The initial proposal was to study team members from the pre-team-formation stage, that is, people who had indicated an interest to join the competition but had not formed their teams, and to follow them over the course of the MIT $1K and $50K competitions. Doing this would allow me to observe team issues as they developed over time and to get real time data of the team formation process. However, in the Fall of 1997, I decided to start data collection from the MIT $1K Competition onwards and to forgo data collection during

the pre-formation stage since the participants' identify were known only after the entries were submitted.

MIT $1K data collection

The purpose of data collection during the MIT $1K Competition was to pre-test the scales and questions developed to explore how team members interacted. Data collection for the MIT $1K Competition began in November 1997 and ended in December 1997. In 18 November 1997, the competition participants submitted their business ideas to the organizers and included in their submissions the names and contact information of team members. In total, 100 entries from 277 participants were received, comprising 23 individual and 97 team entries. Since the study was about team issues, questionnaires were only sent to the participants that belonged to teams. The questionnaires, a copy of which is attached in Appendix 3, were mailed on 20 November 1997 and participants were requested to complete them by 4 December 1997. For each questionnaire, the names of the participant's team members were listed and the participant was asked to consider only the people listed as members when answering questions. This procedure was adapted from Ancona and Caldwell (1992a) to increase the chances that members had the same people in mind when they described their team's interactions. On 12 December 1997, I telephoned the participants who had not returned the questionnaires and requested that they did so as soon as possible. Of the 250 questionnaires mailed, 64, or 26 percent, were returned.

Although the response rate was low, I did not do any follow up after the telephone reminder because many of the participants (about 80 percent of the participants were university students) had examinations during that month. Follow-up after their examinations was also not practical for two reasons. First, the examinations were followed by winter holidays and second, the MIT $50K Competition questionnaire would be mailed in February 1998 and I did not want the participants to complete two questionnaires within a month of each other. Doing that could potentially lower response rate during the MIT $50K Competition phase of data collection. Although only 64 questionnaires were received, this number was sufficient to test the reliabilities of the scales developed. The MIT $1K Competition data were not used to do confirmatory data analysis on how team factors influenced performance because informal interviews with the competition participants indicated that many of these teams spent little time working together. In some cases the teams prepared their competition submissions over lunch or during a meeting in one of the participant's dormitory. Data from the questionnaires showed that team members spent an average of five hours working together.

The teams in this sample were small, comprising mostly males (74 percent) and MIT students (76 percent). Of the 97 team entries, 27 teams had two members, twenty-six teams had three members, twelve teams had four members, four teams had five members, three teams had six members, four teams had seven members and one team had eight members. Of the students in the sample, 61 percent were graduate and 38 percent undergraduate students, representing 33 percent in management and 48 percent in engineering (including computer science) majors. This description suggested that there was limited demographic diversity among team members and a

limitation is that the results of the study might not apply to entrepreneurial teams in general. In the final chapter, I discuss the generalizability of the study to entrepreneurial teams in other settings.

Nine scales were used to determine different aspects of team factors, including internal task processes (Ancona and Caldwell, 1992a), coordination (Ancona and Caldwell, 1992a), effort (self-developed), boundary management (Ancona and Caldwell, 1992a; Louis and Yan, 1996), social integration (Smith et al., 1994), conflict (Jehn, Northcraft and Neale, 1997), team identity (Hinkle et al., 1989), satisfaction (Jehn, 1995) and member-rated performance (Ancona and Caldwell, 1992a). A listing of these scales together with their reliabilities are shown in Table 3.3 and the correlations among scale items in Table 3.4.

INSERT TABLES 3.3 AND 3.4 HERE

With the exception of the effort scale (Cronbach alpha of 0.19) that included questions on the number of hours members worked, both individually or as a team, and the percent of meetings attended, the other scales had at least average reliabilities (lowest Cronbach alpha of 0.64). Due to its low reliability, the effort scale was dropped from the study. The social integration scale was also dropped because it correlated highly (r=0.73) with team identity scale. In addition, it included questions relating to team boundary management (e.g., the members of the team are quick to defend each other from criticism from outsiders and the members of this

team really stick together) and decision-making (e.g., when final decisions are reached, it is common for at least one member of the team to be unhappy about the decision) that had been asked in other parts of the questionnaire. The coordination scale was also dropped because it correlated highly with the internal task processes scale (r=0.66). Although the boundary management scale also correlated highly with the internal task processes scale (r=0.62), the scales were retained because some researchers (e.g., Ancona and Caldwell, 1998) had documented the need to study factors both internal and external to the team. The team identity scale correlated highly with the boundary management scale (r=0.69); however, the team identity scale was retained because team identity is an important component of a team (e.g., Hinkle et al., 1989) but few studies have examined how team identity influences performance (Scott, forthcoming). The correlations also showed that member-satisfaction correlated highly with member-rated performance (r=0.66), a finding that was similar to that found by Gladstein (1984). In addition to these scales, the questionnaire also included questions on how members made major decisions in the team, and semi-open ended questions (in tabular form) that asked participants to describe the division of tasks in the team and member external contacts. An examination of the responses to these questions suggested that members did not have problems answering them. Overall, the pre-test of the questionnaire showed that the scales were reliable and the participants did not have problems answering the questions. The pre-test also enabled me to determine which scales were redundant and thereby omitting them from the questionnaire to be mailed after the MIT $50K Competition—having a shorter questionnaire is beneficial because that could potentially increase response rate (Dillman, 1972).

MIT $50K data collection

This section describes the steps taken to collect information from the MIT $50K Competition participants, a process that lasted from 25 February 1998 to 5 May 1998, and a description of the sample characteristics. The information collected were mostly similar to that in the MIT $1K Competition questionnaire with four major differences. First, some scale items that were identified in the pre-test to be either not reliable or highly correlated with other scale items were omitted. Second, participants were asked to submit their resumes together with their entries. Third, in addition to member perceived team performance, judges' ratings of team performance were collected and fourth, 13 interviews were conducted to illustrate team functioning.

The main difference between the process of data collection during the MIT $50K competition and the MIT $1K Competition was that a series of steps, including pre-questionnaire notification and post-questionnaire follow-ups were conducted to increase the chances of getting higher response rates. As in the case of the MIT $1K Competition, information was only gathered from participants who were members of teams. On 25 February 1998, I collected the business plans from the MIT $50K participants and checked that the participants' resumes and contact information were present. On that day, a total of 82 entries were received, comprising 78 team and four individual entries.

On 26 February 1998, an email, attached in Appendix 4, was sent to the participants—95 percent of the participants had email addresses—telling them to expect a questionnaire in the

mail. On the morning of 27 February 1998, a questionnaire, attached in Appendix 5, was mailed to each participant requesting that they return it by 8 March 1998. On 5 March 1998, a postcard reminder, attached in Appendix 6 was sent to all participants, reiterating the importance of their responses so that the study accurately represented the opinions of the teams. On 18 March 1998, a reminder letter was sent to participants who had not responded to the questionnaire. This mailing included another copy of the questionnaire in the case that they had misplaced the original questionnaire. On 31 March 1998, I telephoned all the participants that had not responded to the mail questionnaire. Data collection for the questionnaire ended when the participants either agreed or did not agree to a telephone interview or could not be reached by telephone. In total, 257 out of 310 participants, or 83 percent, responded to the questionnaire. With the exception of one team, all the other teams turned in at least one questionnaire. However, in four teams, less than 50 percent of the members returned the questionnaires and these teams were omitted from the study. Thus the sample in this study comprised 73 teams that participated in the 1998 MIT $50K Competition.

Description of the sample

The characteristics of the sample resembled that in the MIT $1K Competition in that most teams were small, with a range of two to 10, and comprised mostly of participants affiliated to MIT (81 percent) and in engineering (49 percent) or management (31 percent) majors. Within the range of team sizes, seventeen teams had two members, 15 with three members, 14 with four

members, 15 with five members, four with six members, four with seven members, three with eight members, none with nine members and one with ten members. About 77 percent of the teams did a plan in a technology area, a finding that was not surprising giving MIT's focus on engineering education. The team members also had limited work experience, with an average of 31 months and a median of 24 months with 52 percent in engineering, 50 percent in management and 13 percent in other areas. More than half the team members were whites (58 percent) and of U.S. citizenship (67 percent). The team members were highly educated with seventy-seven percent of the participants having or pursuing graduate degrees and the remainder having or pursuing undergraduate degrees. Of the undergraduate students, 61 percent were seniors and 33 percent juniors (only four participants were freshmen or sophomores). Of the teams in the study, 39 percent proceeded from the initial stage of the MIT $50K Competition (the focus of the study) to the semi-finals stage of the competition. A listing of the sample characteristics is shown in Table 3.5 and the limitations of the sample are discussed in the final chapter.

INSERT TABLE 3.5 HERE

Interviews

In April till early May 1998, I decided to do some interviews to augment the questionnaire data. The semi-structured interviews, with the interview guide attached in

Appendix 8, collected information on team formation, team activities, structures, member interactions with people outside the team and steps that the team had taken to start a business venture. The decision was to choose interviewees that represented different backgrounds (management and engineering, and undergraduate and graduate students) and from teams with different sizes and types of industries (teams represented by all four judging cells). The interviewee characteristics are shown in Table 3.5 above. Over a period of three weeks, starting 20 April 1998, a total of 13 tape recorded interviews were done, comprising one member of different teams. The interviews lasted from a half to an hour each. After three weeks, I stopped interviewing because to match the interview data with the quantitative data, the interviews should be conducted close to the time the plans were submitted. In addition, the participants who were university students had examinations in May and many had already been contacted several times to get them to complete the mail questionnaire. The interviewee characteristics resembled that of the team members in the sample in that most were males, with engineering or management backgrounds and in teams that submitted technology related plans. However, the interviewees over-represented males (there was only one female), non-U.S. citizens and all were MIT students. Since a small number of interviews were conducted, the information that the interviewees provided was only used for illustrative purposes. Given this number, no particular analysis procedure was conducted other than to read the transcripts to get a sense of how the teams functioned. Limitations of the interview plan are discussed in the concluding chapter.

Information from judges

In addition to the questionnaires and the interviews, data were also collected from the competition judges. On 8 March 1998, the MIT $50K judges met to select teams for the semi-final stage. The judges' ratings covered different aspects of a business plan including the team's ability to define the customer, show high business potential, describe its product or service, differentiate from competitor's product or service, protect its competitive advantage, balance the team, substantiate claims and quantify the business model. On average, each team was evaluated by two judges with the average ratings positively correlated at 0.38 (judges ratings taken as the average of 10 performance items) with a median correlation of 0.43 and in only five instances did the judges have negative correlations. The judges' ratings form a performance measure used in this thesis and a copy of the form that they used to rate the teams is attached in Appendix 2.

Conclusion

This chapter describes the advantages of studying team-based entrepreneurial activities in a business plan competition and steps taken to collect data from sample participants. However, several limitations of this sample should be noted. First, this study is about the early stage performance and not about entrepreneurial teams in general. For example, Reynolds (1997) notes that new firms go through the stages of gestation, new firm at infancy, fledging new firm and established new firm. The teams in this study are still in the gestation stage. Second, the

characteristics of these teams resemble start-up teams although they are not "real world" start-up teams because some team members may join the competition for the experience of preparing a business plan rather than to start a new business venture[2]. In addition, all the teams in this study are engaged in preparing a business plan and according to Carter et al. (1996), entrepreneurs do not go through the same start-up sequence. Further, eighty percent of the participants come from one institution, the Massachusetts Institute of Technology. Thus the findings should be interpreted as suggestive, rather than conclusive, of factors influencing early stage new venture team performance.

The next three chapters present different papers that explore the effects of team factors on short-term entrepreneurial team performance. The method sections in these papers describe the scales (including scale reliabilities) used in each paper and the results of factor analyzing these scales. The next chapter also describes the performance measures used in this thesis. Since all papers in this thesis use the same performance measures, the papers after that do not describe how short-term entrepreneurial team performance was measured.

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[2] The structure of the competition mitigates this, since only teams that incorporate and are evaluated by the judges to have made sufficient progress in their ventures will get the prize money awarded to them.

Table 3.1. Comparing Education Level in Roberts's (1991a) Sample of High-Technology Entrepreneurs and the Sample in This Dissertation

Education level	Roberts (1991a) technical Entrepreneurs (percent)	This study (percent)
High School	1	0
College, without degree or pursuing college	8	13
Bachelors degree	27	10
Pursuing Masters degree	NA	42
Masters degree or Prof. Engineer	32	16
Pursuing Ph.D.	N.A.	13
Ph.D.	31	6

Source: Roberts, 1991a:60

Table 3.2. Major Events in the MIT $1K and MIT $50K Competitions and Actions Taken for this Study.

Date	MIT $1K & $50K Events	Action Taken For This Study
1997 Late summer		Contacted lead organizer of the MIT Business Plan Competition and got her support to study teams in the competition. Initial plan to track members from pre-team-formation stage till the end of the MIT $50K Competition.
Early Fall		Attended organizer meetings. Discovered that it was not possible to identify the population of "pre-formed" teams and decided to track teams from the MIT $1K Competition stage onwards.
18 Nov	MIT $1K Competition entries due.	Collected the entries from the participants and the participants' contact information.
20 Nov		Questionnaires mailed to participants.
Late Nov		Informal interviews with MIT $1K members. Found that most members spent little time, approximately five hours, working together as a team.
04 Dec		Due date for the MIT $1K questionnaires.
12 Dec		Telephone reminder to MIT $1K participants.
24 Dec		Stopped data collection. Response rate of 26 percent.
1998 25 Feb	MIT $50K Competition entries due.	Collected the entries from the MIT $50K participants and checked that their resumes and contact information were present.
26 Feb		Sent email to the MIT $50K participants informing them to expect a questionnaire in the mail.
27 Feb		Mailed questionnaire to MIT $50K participants.
5 March		Postcard reminder to all MIT $50K participants.

Table 3.2 continued. Major Events in the MIT $1K and MIT $50K Competitions and Actions Taken for this Study.

Date	MIT $1K & $50K Events	Action Taken For This Study
8 March		Due date for MIT $50K questionnaire. Attended judging session. Collected judges' feedback on the teams (written) and the judges' mental models describing what they thought was important to be in a plan.
18 March		Reminder letter to MIT $50K participants who had not responded to the questionnaire.
31 March		Telephoned MIT $50K participants who had not responded to the mail questionnaire.
5 April		Stopped data collection. A response rate of 83 percent.
20 April		Started interviews.
05 May		Ended interviews and data collection for the study.

Table 3.3. Reliabilities of the Scales in the MIT $1K Questionnaire.

	Cronbach alpha	**Questions in Appendix 3**	**Number of scale items**
Internal Task Processes (Ancona and Caldwell, 1992a)	0.75	Section 1, questions Int1 to Int 3.	3
Coordination (Ancona and Caldwell, 1992a)	0.68	Section 1, questions Coord1 to Coord3.	3
Effort scale (Self developed)	0.19	Section 2, questions Eff1 to Eff3.	3
Boundary Management (Ancona & Caldwell, 1992; Louis and Yan, 1996)	0.79	Section 3, BM1 to BM7.	7
Social Integration (Smith et al., 1994)	0.64	Section 4, questions SocIn1 to SocIn9.	9
Conflict (Jehn, Northcraft and Neale, 1997)	0.92	Section 4, questions ConR1 to ConR4, ConT1 to ConT4 and ConP1 to ConP3.	11
Team Identity (Hinkle et al., 1989)	0.80	Section 5, questions Iden1 to Iden9	9
Satisfaction (Jehn, 1995)	0.72	Section 5, questions Sat 1 and Sat 2.	2
Member-rated Performance (Ancona and Caldwell, 1992a)	0.86	Section 5, questions Perf1 to Perf 6.	6

Table 3.4. Correlations Among the Scales in the MIT $1K Questionnaires

	Scale	Mean	SD	1	2	3	4	5	6	7	8	9
1	Internal Task Processes	5.51	0.97	1.00								
2	Coordination	5.23	1.01	0.66	1.00							
3	Effort	6.10	5.47	0.12	-0.02	1.00						
4	Boundary Management	5.40	0.94	0.62	0.62	-0.01	1.00					
5	Social Integration	5.87	0.55	0.49	0.46	0.10	0.56	1.00				
6	Conflict	1.93	0.73	-0.05	-0.13	0.01	0.04	-0.17	1.00			
7	Team Identity	6.04	0.75	0.59	0.55	-0.02	0.69	0.73	-0.10	1.00		
8	Satisfaction	5.82	1.07	0.56	0.52	0.02	0.64	0.56	-0.11	0.80	1.00	
9	Member-rated Performance	5.19	0.98	0.65	0.59	0.12	0.60	0.49	-0.11	0.57	0.66	1.00

Table 3.5. Characteristics of the MIT $50K Sample and the Interviewee Characteristics.

Interviewee number	**INT 1**	**INT 2**	**INT 3**	**INT 4**	**INT 5**	**INT 6**	**INT 7**	**INT 8**	**INT 9**	**INT 10**	**INT 11**	**INT 12**	**INT13**	**Interviewee summary (N = 13 individuals from 13 teams)**	**Sample summary (N= 73 teams)**
Type of product described in business plan	Hi-tech	Hi-tech	Hi-tech	Hi-tech	Hi-tech	Non hi-tech	Non hi-tech	Non hi-tech	Non hi-tech	Non hi-tech	Hi-tech	Hi-tech	Hi-tech	62 percent high-tech. 38 percent non - high-tech.	77 percent high-tech related plans. 23 percent non-high-tech related plans.
Race	Information omitted for confidentiality purposes													69 percent non-whites. 31 percent whites.	58 percent members non-whites. 42 percent members whites.
Nationality	Information omitted for confidentiality purposes													62 percent non-U.S. 38 percent U.S.	33 percent members non-U.S. citizens. 67 percent members U.S. citizens.

Table 3.5 continued. Characteristics of the MIT $50K Sample and the Interviewee Characteristics.

Interviewee number	**INT 1**	**INT 2**	**INT 3**	**INT 4**	**INT 5**	**INT 6**	**INT 7**	**INT 8**	**INT 9**	**INT 10**	**INT 11**	**INT 12**	**INT13**	**Interviewee summary (N = 13 individuals from 13 teams)**	**Sample summary (N= 73 teams)**
Education level	Graduate	Graduate	Graduate	Graduate	Undergrad	Graduate	Undergrad	Graduate	Graduate	Graduate	Undergrad	Graduate	Graduate	77 percent in grad. school. 23 percent undergrad.	77 percent members in graduate school or with graduate degrees. 23 percent members with or purusing bachelors' degrees.
Education major	Mgmt	Engr	Engr	Engr	Engr	Engr	Engr	Mgmt	Mgmt	Engr	Engr	Management	Engr	69 percent Engr. 31 percent Mgmt.	49 percent members in Engr. 31 percent in Mgmt. 20 percent in others.
Months of work experience	Above median	below median	Below median	Below median	below median	below median	Below median	above median	above median	Below median	Below median	below median	below median	Average of 20 months, median of 12 months.	Average member work experience of 31 months, median of 24 months.

Table 3.5 continued. Characteristics of the MIT $50K Sample and the Interviewee Characteristics.

Interviewee number	**INT 1**	**INT 2**	**INT 3**	**INT 4**	**INT 5**	**INT 6**	**INT 7**	**INT 8**	**INT 9**	**INT 10**	**INT 11**	**INT 12**	**INT13**	**Interviewee summary** (N = 13 individuals from 13 teams)	**Sample summary** (N= 73 teams)
Area work experience	Engr	Engr	Engr	Mgmt	Engr	Engr	Engr	Mgmt	Engr	Engr	Engr	Mgmt	Engr	77 percent Engr. 33 percent Mgmt.	52 percent members in Engr. 50 percent in Mgmt. 13 percent in others.
Entered Semi-finals	No	Yes	No	No	No	No	No	No	Yes	Yes	No	No	Yes	31 percent semi-finalists	39 percent semi-finalists.
Team Size	Above mean	Above mean	Below mean	Below mean	Below mean	Below mean	Above mean	Below mean	Above mean	Above mean	Below mean	Below mean	Above mean	4	Average and median of 4. Specifically: Size # teams 2 17 3 15 4 14 5 15 6 4 7 4 8 3 10 1

CHAPTER 4

EFFECTS OF TEAM TASK DESIGN AND PROCESSES ON ENTREPRENEURIAL TEAM PERFORMANCE

This chapter explores how short-term entrepreneurial teams can be designed to be high-performing. Team design is important, because some researchers have argued that unlike other factors, such as the environment, design is within the control of team members (Cohen and Bailey, 1997:243). Design is especially important at the early stage of a team's development because early experiences get routinized (e.g., Stinchcombe, 1965), affecting the venture's culture (e.g., Schein, 1983) and future growth rates (Eisenhardt and Schoonhoven, 1990).

This paper makes several contributions. First, it shows that both team task design and processes affect short-term entrepreneurial team performance. Some researchers concentrate on task design (e.g., Hackman, 1987), while others on team processes (e.g., Argyris, 1964; Senge, 1991). This study shows that both sets of factors need to be scrutinized. Second, this study shows that task design and processes have different effects on performance. While task design affects external evaluations of performance, processes affect members' evaluations of performance. No study to my knowledge has shown that task design and processes have different effects on team performance. Both external and internal evaluations are important (e.g., Hackman, 1987). While positive external evaluations increase the likelihood of entrepreneurial teams getting external support, such as funding (e.g., Roberts, 1991b); positive internal evaluations increase the likelihood that members are satisfied with team participation (e.g., Hackman, 1987). The third contribution of this study is that it highlights that a more parsimonious description of team

processes is needed. The study shows that the different components of team processes (such as conflict, internal task processes and team identity) are highly correlated. Consequently, some factors, such as task conflict and internal task processes, might belong to the same construct.

In the next section, I describe how three aspects of team design, including team size, extent of team decision making and level of specialization, influences the performance of short-term entrepreneurial teams. These task-design factors are important because they affect the amount of information available to the entrepreneurial team and information is crucial for entrepreneurial teams to perform well (Kirzner, 1997). This is followed by the exploration of how teams processes—defined as how members interact with one another (e.g., Ancona et al., 1996, Module 3:10; West and Anderson 1996; Hackman, 1987)—affect performance. I focus on internal task processes, team identity and conflict because these processes influence the extent members work towards a common objective and are able to combine their information effectively. The task design and processes variables modeled in this chapter are shown in Figure 4.1.

While some researchers argue that task design affects team interaction patterns which in turn affects team performance (e.g., Hackman, 1987), the study models both task design and processes as main effects. This is because teams in this study are in the early start-up phase; a phase in which many team practices have not been routinized (e.g., Stinchcombe, 1965) and consequently structures and processes co-evolve. After describing the methodology, research findings are described. Finally, the chapter concludes with implications concerning how short-term entrepreneurial teams can be designed to be high-performing.

INSERT FIGURE 4.1 HERE

TASK DESIGN AND ENTREPRENEURIAL TEAM PERFORMANCE

This section describes how team task design affects the performance of entrepreneurial teams. I focus on task design factors that can impact the amount of information available to the team, because the ability to discover entrepreneurial activities depends on the accessibility of new information and the ability to use it in new ways (Kirzner, 1997).

Benefits of larger team size for entrepreneurial team performance

Size is one of the team structural components (e.g., Gladstein, 1984) that has been shown by numerous researchers (e.g., West and Anderson, 1996) to affect team performance. There are two effects of size on performance. Larger teams have potentially more information and that is beneficial to performance (West and Anderson, 1996). However, larger teams also face process losses (Gooding and Wanger, 1985), such as coordination costs (West and Anderson, 1996) and difficulty of communication (Smith et al., 1994). Supporting these arguments, the effects of size on performance have been mixed. For example, Vinokur-Kaplan (1995) found size to negatively predict performance of interdisciplinary hospital teams of between five and 12 members. On the other hand, Campion et al. (1993) found that larger clerical worker teams performed better. West and Anderson (1996) conclude that the effect of size on performance is curvilinear. In smaller teams the information benefits outweigh process losses and size positively predicts performance while in larger teams, defined by them as more than 12 to 13 members, process losses outweigh information gains and size predicts negative performance.

Although, the effect of size on team performance is curvilinear, within entrepreneurial teams, I expect size to positively predict performance because research on entrepreneurial teams show that these teams tend to be small—with four or less founding members (e.g., Roberts, 1991a; Vyakarnam, Jacobs and Handelberg, 1997). For example, Roberts (1991a) in a study of MIT laboratory spin-offs found a median founding team of two members while studies by Chandler and Hanks (1998) and Vyakarnam et al., (1997) found an average of four founding members. In this study, the average founding entrepreneurial team size was four with a range of two to 10.

Hypothesis 1: Within the range of team size in entrepreneurial teams, larger entrepreneurial teams will perform better than smaller entrepreneurial teams.

Benefits of team decision making for entrepreneurial team performance

In the previous paragraphs, I argue that within the range of team size in entrepreneurial teams, larger entrepreneurial teams tend to have more information and are thus more likely to perform better than smaller entrepreneurial teams. This section explores how tasks that are designed to increase members' ability to pull their information together would also have a positive effect on performance. I focus on how tasks are allocated in the team—namely, the opportunity for members to participate in decision making and the opportunity for members to perform different tasks.

I expect that entrepreneurial teams that are designed so that members can make decisions together will perform better than teams where decision making is more autocratic. The ability to

make decisions collectively facilitates information exchange among team members and results in more information being available to the team (Shaw, 1981). This in turn promotes innovation (West and Anderson, 1996) and cross-fertilization of existing ideas (Pearce and Ravlin, 1987; Porac and Howard, 1990). For example, in a laboratory study, Volkema and Ronald (1998) found that teams that were able to jointly formulate their problems performed better in the winter survival exercise than teams that did not formulate their problems together. Similarly, Lipshitz and Bar-Ilan (1996) found that teams that jointly discussed issues produced better results than teams that did not. In a field study, Eisenhardt, Kahwajy and Bourgeois (1997) found allowing members to work together to shape options resulted in more creative problem solving. In another field study, Simons (1995) found that discussions among top management members increased members' understanding of their environments. These teams were less resistant to change and were more profitable than teams that had less discussion among top management members. The need to combine information is especially important for the teams in this study who are in the early start-up phase. Their task requires that they conceptualize a whole business model (Olive, 1996), which demands that they know how different aspects of a business, including finance, marketing and product development, fit together (Olive, 1996).

Various participants illustrate the advantages of participation in decision making. For example, one interviewee (INT 13) said that "We don't shun what anybody says. We always give that person half a chance to speak and that is important because you need a diverse amount of ideas, and then you realize that this is something truly different . . . We realized that if we wanted this company to succeed, then we really had to give each other the chance to speak out." Another team member (INT 9) said that the team's strength is that "everyone is very open to one another, no one idea is shot down." Although this team did not win a prize during the

competition, its competition performance was above average, and it had started operations with an office in Waltham, Massachusetts.

Hypothesis 2: Entrepreneurial teams in the early start-up stage that are designed with member participation in decision making will have higher performance than teams designed with less member participation.

Benefits of assigning tasks to members as generalists to entrepreneurial team performance

The previous section hypothesizes that designing decision making to be participatory benefits the entrepreneurial team by enabling it to pull together team members different information. Another approach proposed by this study is to divide team tasks in a way that allows members to function as generalists rather than specialists. Assigning tasks to generalists instead of specialists is expected to be beneficial for performance because it allows members to contribute to different parts of the business model rather than to just a narrow portion of it. In the context of this study, I define a specialist to be a person that participates in specific team tasks while a generalist participates in the full range of team tasks.

The division of tasks among teams is defined as task differentiation or the extent of specialization in the team (Jones, 1994:49). When specialization is low, members perform a wide scope of tasks; when specialization is extensive, members perform within a narrow scope of tasks (Daft, 1995:16). High specialization has been defined as mechanistic structures (Burns and Stalker, 1961) or as bureaucratic structures (Spender and Kessler, 1995), and low specialization as organic structures (Burns and Stalker 1961). In mechanistic structures, there is a clearly

delineated one-to-one correspondence between person and task, so that each person has an area of specialization and is expected to work within the structural role boundaries (Jones, 1994:77). By contrast, organic structures are characterized by loosely defined roles, where members execute a range of different tasks (Jones, 1994:77).

The literature suggests that there is no one best way to divide the tasks, but that the best way depends on the nature of the task the teams are engaged in. Task specialization can be beneficial in routine procedures, where knowledge needed to get the work done is common and the focus is on knowledge application (Spender, 1995; Adler and Borys, 1996). In this instance, task specialization improves team performance because it allows team members to delve deeply into the particular task at hand (Alder and Borys, 1996; Daft, 1995). In innovative activities, however, where tasks are nonroutine and knowledge is incomplete, task generalization is preferred (Alder and Borys, 1996; Spender, 1995) because it enables team members to have a better understanding of the issues faced by the team as a whole (Van de Ven, 1986). The teams in this study are engaged in the innovative task of preparing of business plan, which demands that they conceptualize a whole business model (Olive, 1996). Thus for this task, I expect that teams that generalize will perform better than teams in which members specialize in a few areas.

Hypothesis 3a: Entrepreneurial teams in which tasks are divided so that members are generalists perform better than entrepreneurial teams in which tasks are assigned to members who specialize in different areas.

Although most researchers have focused on either generalization or specialization (e.g., Adler and Borys, 1996), the interviews reveal that instead of either allocating tasks to generalists

or specialists, some teams make use of the hybrid form of tasks division, where members specialize in some areas but are generalists in others. This study therefore expands the existing literature by showing that generalization and specialization are not two ends of the continuum, but that teams can both specialize and generalize simultaneously. One member illustrated the point (INT 3): "Individuals each knew their strengths. Business, selling, . . . each person [was strong in] some of that. Writing the proposal was back to a group effort. Two wrote, two persons reviewed and as a group, we compiled together." Another team member said that each team member (INT 6) had a "piece that we could take care of. I looked into how we could integrate the technology, and this guy looked at the technology side and [the third] person looked at the corporate relations side . . [but] we voice our opinion even if it falls onto someone else's category." These teams are able to divide work so that each member specializes in some area yet at the same time has the opportunity to combine different perspectives. Therefore, I expect that teams in which members are both specialists and generalists to perform as well as entrepreneurial teams where members are generalists.

Hypothesis 3b: Entrepreneurial teams in which tasks are divided so that members are both generalists and specialists perform just as well as teams in which tasks are assigned to members who generalize.

ENTREPRENEURIAL TEAM PROCESSES AND TEAM PERFORMANCE

The previous section argues that entrepreneurial teams should be larger and that tasks should be designed to utilize participatory decision making and generalized task allocation. This

section explores how team processes—that is, the way in which members relate to one another (Hackman, 1987, Hambrick, 1994)—affect entrepreneurial team performance by influencing the ability of members to integrate their perspectives and to deal with differences constructively.

Benefits of good internal task processes on entrepreneurial team performance

Good team dynamics reduces process loss and allows team members to work smoothly; without good processes, team members could pull in different directions (Ancona and Caldwell, 1992a). Although there are many team processes, I focus on processes related to the task since some researchers argue that these processes are the key drivers of team performance (e.g., Ancona and Caldwell, 1992a). Task processes comprise the ability of the team to define goals, develop workable plans and prioritize work (Ancona and Caldwell, 1992a).

Successful teams develop commitment to a common approach to how they will work together to achieve their common objectives (Katzenbach and Smith 1993). Superb teams usually have clear and engaging goals (Weldon and Weingart, 1993, Wageman, 1997), which provide a reason for the team's existence and what the team wants to achieve. These goals help members make intelligent trade-offs, (Wageman, 1997) and the ability to comprehend what they want to achieve facilitates members' ability to combine their efforts (West and Anderson, 1996). Consequently, the presence of clear goals predicts team performance (e.g., Guzzo and Shea, 1992; Pritchard, Jones, Roth, Stuebing, and Ekeberg, 1988). In fact, West and Anderson (1996) concluded that the presence of goals is the only consistent factor positively predicting team performance. In a study of 418 project teams, Pinto and Prescott (1987) found that clarity of

goals was the only factor that was associated with team success at all stages—conception, planning, execution and termination—of the innovation process.

The interviews with team members illustrate benefits of having good processes. One member (INT 9) said that during its first meeting, the team members "had different ideas of what was going on . . . [and] during the first meeting, [we sorted out]. . . these differences and by the end of the meeting we came to an understanding of what we wanted out of [the team]." Another member (INT 13) illustrated the problems of a lack of clear goals stating that "One thing we could change is the improvement of our organizational efficiency and [have] more focused meetings . . . we have a vision, but in our next two meetings, we had a new vision . . . We need to step up front and say, 'if we are going to do this, let's just do that right now.' It is always hard to find the super best idea, because new ideas are always popping in. Just stick with the really, really good idea and work with that and then mention in your business plan that there are these potential businesses you want to go into. Otherwise, we would just be rehashing old ideas, we weren't getting anywhere."

H4: Entrepreneurial teams that are better able at managing their internal task processes—as determined by the ability of the team to define its goals, prioritize work and to develop workable plans—will perform better than teams that are less able to manage their internal task processes.

Benefits of a common team identity to entrepreneurial team performance

Teams with good internal task processes are aware of their team's goals and are in turn able to make intelligent trade-offs to achieve these common objectives (Wageman, 1995). This

section predicts that entrepreneurial teams in which members share a common team identity will perform better than entrepreneurial teams where members do not have a common identity. Campion, Papper and Medsker (1996) define team identity as members' perception of themselves as belonging to one team and as permanent members of the team. Similarly, Scott (forthcoming) defines team identity as the members' cognitive identification with a team, and adopting the team's problems as their own, irrespective of personal feelings towards other team members. Other researchers (e.g., Tajfel, 1978) argue that there are at least two dimensions of team identity, namely, the cognitive and the interpersonal components. According to Hinkle et al. (1989), cognitive identity refers to the extent that individuals adopt team goals as their own while emotional identity refers to interpersonal attraction among team members. Supporting Hinkle et al. (1978), Tajfel (1978) defines social identity as "that part of an individual's self-concept which derives from his [her] knowledge of his [her] membership of a group, together with the value and emotional significance attached to the membership" (p.63.)

Although few studies have explored the effects of identity on performance (Scott, forthcoming), indirect evidence is provided by the cohesion literature. Goodman, Ravlin and Schminke (1987:144) found that most definitions of cohesiveness included attraction to team (e.g., Back, 1951:9; Organ and Hammer, 1982:325) and a wish to continue membership in the team (e.g., Festinger et al., 1950, p.164; Steers 1981, p. 199)—definitions that are similar to the emotional component of team identity. Guzzo and Shea 1992, and Mullen and Copper, (1994), found that team cohesion is a positive predictor of team performance. Similarly, in a meta-analysis, Cohen and Bailey (1997:256) note that both laboratory and field studies have found moderate support for the positive effects of cohesion on performance (e.g., Mullen and Cooper, 1994). More direct evidence is provided by Scott (forthcoming) who found that team identity is

beneficial for team performance. Specifically, in a sample of 42 product development teams, she found that team identity positively predicted the team's ability to keep to budgets and schedules and higher technical quality outputs.

As suggested in the interviews, a lack of team identity can be detrimental to performance as members are not committed to working towards team objectives. One member (INT 8) said that "I think not everybody is as committed or not equally committed. I feel like I am very committed to the team and so is Zenith, but Mike sometimes seems committed but sometimes is not. For me it is an idea that I came up with and I feel close to it and to really make it work but for others it might be oh, it is a good idea, good to do it while we are in school." In this instance, the leader has committed to starting the business after graduation, but the other members have not. Although performance is the result of a variety of factors, it is possible that this team's mixed level of member identity, contributed to its average performance level.

Hypothesis 5: Entrepreneurial teams that have higher levels of team identity will perform better than entrepreneurial teams with lower levels of team identity.

Mixed effects of conflict on entrepreneurial team performance

Different perspectives among team members can lead to more creative solutions (e.g., Eisenhardt, Kahwajy and Bourgeois, 1997). However, differences in opinions can quickly degenerate into interpersonal hostilities (e.g., Eisenhardt et al., 1997). The ability of members to combine their perspectives effectively depends on the members' ability to focus on differences

constructively (e.g., Eisenhardt et al., 1997). In accordance with the literature reviewed below, I argue that teams that are able to focus their differences on task issues perform better than teams that focus on interpersonal differences.

Jehn (1995:257) defines conflict as perceived incompatibilities or perceptions by parties that they have different views or interpersonal differences. Many researchers have distinguished task from relationship conflict (e.g., Simons and Peterson, 1998; Amason and Sapienza, 1997; Shah and Jehn, 1993; Jehn, 1995). Task conflict is sometimes defined as cognitive conflict (e.g., Amason and Schweiger 1994) or content conflict (e.g., Shah and Jehn, 1993). Task conflicts are disagreements about the work that the team is doing (e.g., Jehn, 1995; Simons and Peterson, 1998), or incompatibilities in judgments or perspectives among team members (Shah and Jehn, 1993; Simons and Peterson, 1998; Amason and Schweiger, 1994). Relationship conflict is defined as interpersonal differences among team members (e.g., Jehn, 1995), not directly linked to the task, and resulting from personal incompatibilities and disputes (Amason and Schweiger, 1994). It usually includes tension, annoyance and hostility among team members (e.g., Priem and Price, 1991). Relationship conflict has been described as emotional conflict by Shah and Jehn (1993), socio-emotional conflict by Priem and Price (1991) and affective conflict by Amason and Sapienza (1997:496). With few exceptions, the difference between task and relationship conflict has survived over 40 years of research (Simons and Peterson, 1998). Empirically, Pinkley (1990) found that in disputants' interpretations of conflict, individuals were able to distinguish between task and relationship conflict.

Conflict can both facilitate and hinder team performance (Amason and Schweiger 1994). There is increasing evidence that task conflict can be beneficial to team performance, while relationship conflict hinders team performance (e.g., Jehn, 1995, Shah and Jehn, 1993; Priem and

Price, 1991). Conflicts focusing on task issues facilitate exchange of information among team members (Jehn, 1995) and enhance understanding of the tasks that need to be performed (Schweiger, Sandberg and Ragan, 1986; Schwenk, 1990). Similarly, Amason and Sapienza (1997:496) argue that cognitive conflict improves strategic decision making because it facilitates information exchange among top management members and can lead them to "see different environments" (Mitroff, 1982, p. 375). Eisenhardt et al., (1997) argue that conflict is beneficial to teams because when members challenge one another, it creates a better understanding and generates a broader range of options. This is illustrated by a team member (INT 6) who said that "Part of the work itself is to have some arguments; otherwise we will not be able to really be self-analytical at all. Arguing actually is good, depending on how people see it. Giving challenge to ourselves [and] making it better, [and] in that sense it is good."

Jehn (1995:260) reasons that teams doing nonroutine tasks benefit from having diverse ideas. Pressure to agree instead of allowing for differing opinions may cause the team to miss higher quality choices as members focus on building consensus, rather than on accepting innovative solutions (Jehn, 1995). She explains that task conflict heightens critical appraisals, which reduces the group-think phenomenon by facilitating evaluation of alternative options. Putnam (1994) found that task conflict facilitated problem identification and understanding; Baron (1991) found that task conflict promoted the development of creative solutions. That lack of conflict can impede performance is illustrated by a team member (INT 1) who said that the team proceeded "smooth[ly], because we felt comfortable working with each other. It was relatively straightforward; we didn't go ahead with something unless we all agreed that was a good thing to do. So maybe in a way that was too little conflict. I think if we had a bit more conflict, we probably would have made decisions easier."

Jehn (1995) argues that the effect of conflict on performance is curvilinear. Beyond an optimal level, the team becomes less effective. Too much task conflict can impede the team's ability to integrate and evaluate information (Brown, 1992). However, within entrepreneurial teams, it is unlikely for there to be high conflict levels, because when members have the opportunity to select their own members, they tend to select those who share similar backgrounds (Westphal and Zajac, 1995). This in turn is associated with fewer differences of opinions among team members (Hambrick, 1995). In this study, the average task conflict was 2.7 on a 7-point scale. Consequently, within the range of task conflict in entrepreneurial teams, it is expected that task conflict will be associated with higher levels of team performance.

Hypothesis 6a: Within the range of task conflict in entrepreneurial teams, teams with higher levels of task conflict have higher performance than teams with lower levels of task conflict.

While task conflict can enhance the performance of teams (e.g., Jehn, 1995), relationship conflict impedes team performance (e.g., Jehn, 1995). Pelled (1996) describes different ways that relationship conflict hampered team performance. First, relationship conflict curbs cognitive processing because it lowers members' capacity to access new information furnished by other team members. Second, it makes members less accepting of the ideas of other team members. Jehn and Mannix (1997) add that conflict restricts cognitive functioning of members because of the stress and anxiety produced, and because the focus of team efforts shifts to group problems. Amason and Sapienza (1997:496) argue that relationship conflict produces suspicion, distrust and hostility. Thus, it can be concluded that this type of conflict causes members to lose

perspective, work less effectively with one another and consequently produce suboptimal team results (Jehn, 1995:258).

Hypothesis 6b: Relationship conflict leads to lower entrepreneurial team performance.

RESEARCH METHOD

Sample

The sample consisted of 73 teams that participated in the MIT $50K Competition in 1998. The questions used in the study were pre-tested during the MIT $1K Competition held three months before the MIT $50K Competition. For the MIT $50K Competition, usable responses were received from 83 percent of the participants. To test the representativeness of the sample, I compared the respondents and non-respondents in the dimensions of age, sex and team size. No statistical differences were found between these groups suggesting that the sample was representative of all the participants in the MIT $50K Competition for that year.

Procedure

The procedure used to collect data followed closely that stipulated by Dillman (1978). A day before mailing the questionnaires, an email was sent to most participants (95 percent of them had email accounts) informing them that a study of entrepreneurial teams was being conducted

and to expect a questionnaire in the mail. A week after mailing the questionnaires, a postcard was sent to each participant reminding him [her] to complete the questionnaire. Two weeks later, a reminder letter was sent, followed by a telephone interview (two weeks after the reminder letter) to those who did not respond to the mail questionnaire. Data collection for the questionnaire stopped when participants either could not be reached by telephone or refused to a telephone interview. I addition to these questionnaires, 13 interviews were conducted to illustrate team functioning.

Task design independent variables

Team size

Teams participating in the competition had to submit a form to the competition organizers, listing the members of their teams. The number of members listed in the form was used to define team membership. Although the effects of team size on performance is expected to be curvilinear, in this study, I modeled a first order effect of size on performance. This was because empirical research on entrepreneurial teams showed that entrepreneurial teams tended to be small, ranging from two (Roberts, 1991) to four (e.g., Chandler and Hanks, 1998; Vyakarman, Jacobs and Handelberg, 1997). In this study, the average team size was four with 95 percent of teams with seven or fewer members. In addition, given the small range of team size, there was high correlation between team size and the square of team size of r= 0.97. Thus, in this study, it would not be possible to empirically detect the curvilinear effects of size on performance.

Extent of member participation in decision making

Extent of member participation in decision making was determined by asking the respondents to choose one of five statements that best described how their teams made main decisions. These statements were constructed by adapting Vroom and Jago's (1988) definition of autocratic, consultative and team decision making. The statements ranged from most autocratic of "One member makes most of the key decisions for the team" to the greatest extent of member participation in decision making of "The team makes most key decisions together as a group." The other three intermediate modes from least to most participative were: "One person makes all the key decisions after consulting other members individually"; "One member makes all the key decisions after consulting members as a group"; and "The key decisions are made as a team but with some members having more influence than others." Members' responses were converted to a Likert scale from 1 to 5, with 1, the most autocratic and 5 the most democratic. The variable was coded as Participation in Decision Making. The mean square of error between and within team were 1.96 and 0.76 respectively (difference statistically significant at $p<0.01$). This suggested within team agreement on how decisions were made. Therefore, I calculated participation in decision making by averaging individual members' ratings. The higher the score, the more members participated in decision making. Although this was a single item scale, it preserved Vroom and Jetton's definition of participation in decision making and a similar scale was used by Barsade, Ward, Turner, and Sonnenfeld (1998).

Level of team specialization

In the questionnaire, members were asked to give an evaluation whether each member in their team was a team specialist, a generalist or both. The definition given to the respondents was that "A specialist participated in specific team tasks while a generalist participated in the full range of team tasks." The questionnaire illustrated that a person who focused mostly on financial projections and the marketing plan was a specialist; a person who participated in all tasks except developing the prototype was a generalist; and a person who participated in all tasks and focused on writing the computer codes was both a specialist and a generalist. A team's score for each category was the average of respondents' ratings for that team. I did not give extra weight to a person who rated himself [herself] because I could not ascertain which provided a better judgment of the overall classification of a member's job scope. An example of specialization was mentioned by a member (INT 2) that "there were a couple of people whose main purpose was to fine-tune the technology and make the demo better and a couple of people whose main purpose was to go out and get research and statistics and documents that would be pertinent to our business and a couple of people would be doing the writing." Some teams generalized as illustrated by a person who wrote in the questionnaire that we "all worked on issues of technology, marketing, intelllectual property, etc."

Processes independent variables

Internal task processes

Internal task processes was measured using the scale developed by Ancona and Caldwell (1992a). The respondents rated their agreement on a scale of 1 to 7 with 1 meaning the statement was very inaccurate to 7 meaning the statement was very accurate. The questions were: "The team is able to define its goals"; "The team is able to prioritize work and determine which aspects of the work are important"; and "The team is able to develop workable plans." The scale was pre-tested with the MIT $1K dataset. Factor analysis with Varimax rotation extracted only one with eigenvalue greater than 1 (Cronbach alpha of 0.74). For the MIT $50K Competition, the Cronbach alpha of the 3-item scale was 0.79. The high Cronbach alpha suggested that this scale was internally consistent. One-way ANOVA showed that the mean square of error between teams was 1.17 and that within team was 0.72 (F value of 1.62, $p<0.01$). This suggested within team agreement on the level of internal task processes and justified averaging members' ratings to calculate a team's level of internal task processes. An example of good internal process was illustrated by a member (INT 2) that "we usually met twice a week and they usually lasted for about an hour and my thesis advisor ran the meeting and made sure everyone was doing their thing. We would meet and go over where we are and what we had to, what statistics we needed to find and what we should be working on."

Team identity

The questions for team identity were adapted from Hinkle et al. (1989) and the scale included emotional, individual/group and cognitive components of identity. According to Hinkle et al. (1989), the emotional component of team identity represents a person's feelings towards the team and measured by: "I identify with this team"; "I am glad to belong to this team"; "I think this team worked well together"; and "I see myself as an important part of this team." The individual/team component reflects the extent that individual and team goals are similar, measured by: "I feel held back by this team" (reverse coded); "I feel uneasy with the members of this team" (reverse coded). The cognitive component refers to the extent members feel a belonging to the team, measured by: "I do not consider the team to be important" (reverse coded); and "I feel strong ties to this team."

The items were pre-tested during the MIT $1K Competition. Factor analysis using Varimax rotation extracted two factors with eigenvalue greater than one. The first factor, with eigenvalue of 3.92 consisted of the emotional identity items and the cognitive identity item of "I feel strong ties to this team." The second factor consisted of individual/team identity and the cognitive item of "I do not consider the team to be important." The two-factor conflict structure was retained in this study since "I feel strong ties to this team" fit into the emotional identity while "I do not consider the team to be important" fit into individual/team identity. The first factor was labeled as emotional Identity and the second factor as goal Congruence Identity. The Cronbach alpha for emotional identity scale was 0.86, while that for goal congruence identity scale was 0.62.

For the MIT $50K participants, the emotional identity scale had a Cronbach alpha of 0.87 while that for the goal congruence identity scale was 0.63. One-way ANOVA showed that the mean square of error between and within teams for emotional identity were 1.59 and 0.93 respectively, statistically different at $p<0.01$. The similar figures for goal congruence identity were 1.09 and .86 respectively, statistically different at $p< 0.10$. The ANOVA tests suggested that there were within team agreement on the levels of emotional and goal congruence identities. Thus for each factor, a team score was calculated by averaging member-ratings.

Conflict

The conflict scale developed by Jehn and associates (e.g., Jehn, Northcraft and Neale, 1997) was used to determine the level of team conflict. The task conflict items in the scale were: "How often do people in your team disagree about opinions regarding the work being done?"; "To what extent are there differences of opinion in your team?"; "How much conflict about the work you do was there in your team?"; "How frequently are there conflicts about ideas in your team?" The relationship conflict items were: "How much were there personality conflicts among team members?"; "How much tension was there among team members?"; "How much emotional conflict was there among team members?" In addition to task and relationship conflicts, Jehn et al. (1997) had questions on procedural conflict which they defined as how members went about doing their tasks. The procedural conflict items were: "To what extent did you disagree about the way to do things in your team?"; "How frequently were there disagreements about who should do what in your team?"; and "To what extent did you disagree about the procedures in your team?"

Exploratory factor analysis with Varimax rotation extracted two factors with eigenvalues greater than one. Factor 1, with an eigenvalue of 5.87 loaded highly on task conflict items and two items from procedural conflict—"To what extent did you disagree about the procedures in your team?"; and "To what extent did you disagree about the way to do things in your team?" Since procedural conflict related to task differences, I retained them in the factor and labeled the factor as Task Conflict. Factor 2, with an eigenvalue of 1.38 loaded highly on the relationship conflict items and one procedural conflict item of "How frequently were there disagreements about who should do what in your team?" This item which referred to task disagreements did not fit with the relationship conflict items in the factor. I removed that item and labeled the remaining items as Relationship Conflict. The Cronbach alpha for relationship conflict was 0.86 while that for task conflict was 0.87. The factor structure found in this study was consistent with most past research (e.g., Amason and Sapienza, 1997) of a two-factor structure comprising task and relationship conflicts.

For the MIT $50K Competition, the Cronbach alpha for relationship conflict was 0.87 and 0.88 for task conflict. One-way ANOVA showed that the mean square of error between and within teams for task conflict were 1.56 and 0.95 respectively, statistically different at $p< 0.01$. Similar figures for relationship conflict were 1.33 and 0.78 respectively, again statistically different at $p<0.01$. The ANOVA tests suggested within team agreement on each conflict type and justified averaging member-ratings to team scores.

The interviewees suggested low conflict levels such as a team-member (INT 8) who said that "we don't have any surprises, we know we can count on each person and [we know] what problem we would encounter with that person and [how] you can avoid it in advance." Another

member (INT 5) when asked to describe the conflicts in his team said "I think both of us were pretty much easy going, so there weren't really any conflict."

Judges' ratings of entrepreneurial team performance

The judges rated the teams using a 10-item, 5-point scale with the higher the better. The items included the teams' ability to: "define the customer", "say who pays for the product or service", "show high potential", "describe the product/service", "analyze the competitors", "differentiate from competitors", "protect the competitive advantage", "balance the team", "substantiate claims" and "quantify the business model." The teams were rated by on average two judges. The competition organizers chose these items to be evaluated after categorizing the written comments of past judges.

The correlations among the items showed that with the exception of the items "protect the competitive advantage" and "balance the team", the average correlations among all the other items were at least r=0.4. The two items were removed because they did not seem to fit with the other performance measures. "Protect the competitive advantage" was primarily about later team performance instead of early stage performance that this study seeks to understand. "Balance the team" did not fit well with the other items because this item related to team factors instead of the quality of plan that the other items referred to. Overall, the high correlations among the eight remaining items (average r of at least 0.4) suggested that the judges tended to evaluate a plan holistically rather than to gauge each item separately. Factor analysis also supported this assertion. Factor analysis using Varimax rotation and eigenvalue greater than one as the cutoff value extracted only one factor with a Cronbach alpha of 0.87. The average of the judges' ratings

for the teams—using these eight items—was used to determine external evaluations of entrepreneurial team performance. This variable was labeled as judges' ratings[1].

Member-ratings of entrepreneurial team performance

In addition to judges' ratings, the team members were asked to rate their teams' performance. They were asked to do this because some researchers have found significant differences between ratings by team members and external performance measures. For example, Gladstein (1984) found that good team processes predicted higher team member-rated performance but these processes did not predict sales revenue.

Following Ancona and Caldwell (1992a) participants were asked to rate their teams on a 7-point scale from 1 meaning the team was deeply disappointing to 7 meaning the team exceeds my expectations. The items were: "Efficiency of team operations", "quality of work we produce", "number of innovations or new ideas introduced by the team", "our adherence to schedules", and "our overall performance." A similar scale was used by Campion, Papper and Medsker (1996) who measured performance measured by "quality of work done", "customer service provided", "productivity", "completing work on time", "completing work within budget, and providing innovative products and services", "responding quickly to problems or opportunities", and "overall performance."

The Member-Ratings of Performance scale was pre-tested using the MIT $1K dataset. Factor analysis using Varimax rotation extracted only one factor with eigenvalue greater than

[1] I also regressed the independent variables with the eight items separately. All the statistically significant coefficients were in the same direction as that using the eight items in one scale. This provided some evidence of the robustness of the findings.

one. This factor, had an eigenvalue of 3.05 and a Cronbach alpha of 0.82. For the MIT $50K sample, the Cronbach alpha was 0.81. One-way ANOVA showed that the mean square of error between teams was 1.17 while that within teams was 0.77, statistically different at $p<0.01$. This suggested within team agreement on the level of entrepreneurial team performance and supported aggregating members' ratings to team scores.

These performance measures will be used throughout this study, namely in chapters five, six and seven.

Industry control

I controlled for industry since investors preferred some industries for early financing (Haar, Starr and MacMillan, 1988). Teams that were involved in technology products or services were given the code of 1 and the rest with a code of 0. Although a more refined measure—comprising more categories—could lead to a better understanding of the attractiveness of different industries, the small sample size limited the number of categories I could include.

Although it is likely that other factors can influence entrepreneurial team performance, given the small sample size and the exploratory nature of this study, only these two variables which I expected to have a large influence on entrepreneurial team performance were controlled.

RESULTS

Table 4.1 gives the correlations, means and standard deviations of the control, dependent and independent variables. Task and relationship conflicts were highly correlated to each other at r=0.66 ($p<0.01$). Similarly, emotional identity and goal congruence identity were highly correlated at r= 0.60 ($p< 0.01$). To test the robustness of the findings to these correlations, Models 4 and 8 (the former for judges' ratings as the independent variable and the later for member-ratings as the independent variable) combined the conflict factors into one conflict scale and the identity factors into one identity scale.

INSERT TABLE 4.1 HERE

For the control variable, 77 percent of the teams were in high-technology related industries. This was negatively correlated at r=-0.40 with judges' rated performance ($p<0.01$). Size positively correlated (r=0.19) with judges' ratings but negatively with member-ratings (r=-0.12). However, both correlations were not statistically significant at $p<0.05$. Average participation in decision making was 3.56 with a standard deviation of 0.89. This suggested that members perceived their teams to use participatory decision making. Participation in decision making positively correlated with judges' (r=0.17) and member-ratings (r=0.33). However, the correlation was only statistically significant ($p<0.01$) for member-ratings.

Mean emotional identity was 5.79 with a standard deviation of 0.77. The respondents also reported high levels of goal congruence identity with a mean of 6.16 and a standard deviation of 0.68. No correlation was found between identity and judges' ratings but identity positively

correlated with member-ratings (r= 0.60 for emotional identity and r=0.45 for goal congruence identity, both statistically significant at $p<0.01$). Team members perceived their internal task processes to be high with a mean of 5.65 and a standard deviation of 0.67. A small correlation with judges' ratings of r=0.08 was found, but this was not statistically significant at $p<0.05$. Correlation between member-ratings and internal task processes was high at r=0.61 ($p<0.01$). Perceived conflicts were low with mean task conflict of 2.66 (s.d. 0.75) and mean relationship conflict of 1.85 (s.d. 0.69).

I hypothesized that entrepreneurial team performance depended on how tasks were allocated in the team and how members interacted with one another. Although some researchers (e.g., Gladstein, 1984) have argued that the effects of task design is through team processes (i.e., as a mediated model), this study included both task design and processes as main effects because the teams in this sample were in the early start-up phase. In this instance, the structures were not likely to be routinized (e.g., Stinchcombe, 1965) and co-evolving with team processes. Eight models are presented to test the hypotheses in the study. Models 1 to 4 shown in Table 4.2 regressed the effects of task allocation and member interaction on judges' ratings of entrepreneurial team performance. Models 5 to 8 were similar to 1 to 4 except that the dependent variable was member-ratings of entrepreneurial team performance.

INSERT TABLE 4.2 HERE

Model 1 regressed the effects of the control variable of industry and the task design variables on judges' ratings while Model 2 regressed the control variables and the task process variables on the same performance measure. Model 3 regressed the effects of all the variables—

control, task design and task processes—on judges' ratings. Model 4 tested the robustness of the findings by combining the two identity factors into the identity variable and the conflict factors into the conflict variable.

Model 1 with an R^2 of 0.27 ($F=5.01$, $p<0.01$) showed that the control variable industry negatively predicted judges' ratings ($b=-0.52$, $t=-3.69$, $p<0.01$) and a reason for this finding (as noted from the judges' comments) was that some high-technology start-up teams focused on the technology instead of conceptualizing a business model. The judges' comments suggested that they were looking for teams that could build a business instead of a technology play. Size ($b=0.09$, $t=2.57$, $p<0.01$) positively predicted judges' ratings. One reason for this finding is that start-up teams are small (e.g., Roberts, 1991a; Vyakarnam, Jacobs and Handelbert, 1997) and larger start-ups teams will have access to more resources without the corresponding process loss of large teams (West and Anderson, 1996). For the task division variables, only two of the three task division categories (specialists, generalists and both specialists and generalists) could be included in the same regression. Since I omitted the generalists category, the coefficients of specialists and both specialists and generalists were compared against that omitted category (i.e., generalists). The findings showed that entrepreneurial teams that designed tasks with members as specialists had lower judges' ratings (coefficient of specialists=-0.62, $t=-1.67$, $p<0.10$). The findings also showed that entrepreneurial teams with members as both specialists and generalists were evaluated as favorably as entrepreneurial teams where members were generalists (coefficient of both specialists and generalists=0.03, $t=0.10$, n.s.). Participatory decision making did not predict higher judges' ratings (coefficient of participation in decision making was 0.06, $t=0.84$, n.s.) but was in the direction predicted. Reasons for this finding are discussed in the next section.

Model 2 regressed the effects of team processes on judges' ratings, with industry as the control variable. The Model's R^2 was 0.21, F=2.50 ($p<0.05$). However, the other process variables of team identity, goal congruence identity, internal task processes, and task and relationship conflicts did not predict judges' ratings.

In Model 3, I included both the task-related and the team process variables in one regression. The R^2 of the Model was 0.30, F=2.72 ($p<0.01$). The delta R^2 was only marginally higher than that in Model 1 (from 0.27 in Model 1 to 0.30 in Model 3, n. s.). However, the delta R^2 change was statistically significant from Model 2 to 3, that is from the process only model to the full model, at $p<0.01$. This suggested that task design variables were better predictors of judges' ratings than team process variables. Supporting hypothesis 1, larger entrepreneurial teams had higher judges' evaluations than smaller entrepreneurial teams (coefficient of size=0.09, t=2.48, $p<0.05$). Hypothesis 2 that participation in decision making predicted higher judges' ratings was not supported, but the coefficient of 0.04 (t=0.56) was in the direction predicted. Reasons are discussed in the next section. Supporting hypothesis 3a, entrepreneurial teams that assigned tasks to specialists were evaluated less favorably than entrepreneurial teams that assigned tasks to generalists (coefficient of specialists=-0.85, t=-2.07, $p<0.05$). Supporting hypothesis 3b, entrepreneurial teams where members were both specialists and generalists were evaluated as favorably as entrepreneurial teams where members were generalists (coefficient of specialists and generalists=-0.03, t=-0.08, n.s.). Hypotheses 4 to 6 on the effects of team task processes on entrepreneurial team performance were not supported. Overall, Models 1 to 3 suggested that team task design influenced judges' ratings while team task processes did not.

In Model 4, I collapsed task and relationship conflicts into one conflict variable and the emotional and goal congruence identities into the identity variable. This was to test the

robustness of the findings given the high correlations among the respective factors. The R^2 was 0.28, with an F=3.08, p<0.01. The findings again showed that the task process variables did not predict judges' ratings. Among the task design variables, the findings were similar to that of Model 3 that larger teams had higher judges' ratings (b=0.09, t=2.53, p<0.01) and teams that assigned tasks to specialists had lower judges' ratings (b=-0.68, t=-2.23, p<0.05).

INSERT TABLE 4.3 HERE

Models 1 to 4 explored the effects of task design and member interactions on judges' evaluations of the teams. Models 5 to 8 were similar to Models 1 to 4 except that the dependent variable was member-ratings. Model 5 included the control variable and the task design variables. Model 5 had an R^2 of 0.15, F=2.29 (p<0.10). The only predictor variable that was supported was that the participation in decision making (b=0.25, t=2.91, p<0.01) positively predicted member-ratings. Neither size (b=-0.05, t=-0.27, n.s.) nor specialization (b=-0.19, t=-0.49, n.s.) predicted member-ratings.

Model 6 included the control variable of industry and the team process variables. I also controlled for size because this variable has been found in many studies to affect how members interacted with one another. The Model had an R^2 of 0.50 with F=10.98 (p<0.01). Emotional identity (b=0.28, t=2.51, p<0.01) and internal task processes (b=0.33, t=2.92, p<0.01) were positively associated with member-ratings.

Model 7 included both the task design and process variables in one regression. The R^2 was 0.55, with an F=7.53 (p<0.01). The delta R^2 was statistically significant from Model 7 to Model 5 at p<0.01 level but delta R^2 from Model 7 to 6 was not statistically significant. This

suggested that task processes were better predictors of member-ratings than task design. Emotional identity with b=0.37, t=3.09 ($p< 0.01$), and internal task processes with b=0.32, t=2.76 ($p< 0.01$) both positively predicted member-ratings. However, task conflict with b=-0.02, t=-0.15 (n.s.) and relationship conflict b=-0.05 and t=-0.39 (n.s.) did not. Among the task design variables, teams that assigned tasks to both specialists and generalists were evaluated by team members less favorably than teams where members were generalists (b=-0.68, t=-2.13, $p<0.05$).

In Model 8 I combined the task and relationship conflicts to form the conflict variable and emotional and goal congruence identities to form the identity variable. The R^2 was 0.54, F=9.53 ($p<0.01$) and the coefficients of the predictor variables were in the same direction as that in Model 7. Hypothesis 1, 2 and 3 (all hypotheses relating to task design) were not supported. Hypothesis 4 that internal task processes positively predicted performance was supported while Hypothesis 5 that team identity positively predicted performance was partially supported. However, no support was found for hypothesis 6 of the effects of conflict on entrepreneurial team performance. Overall, Models 5 to 8 suggested that task processes influenced member-ratings while task design did not. The results are discussed in the next section.

DISCUSSION AND CONCLUSION

The study explores whether a short-term entrepreneurial team can be designed—both task design and task processes—to be high-performing. Designing teams in the early start-up phase is important because early activities influence the venture's culture (e.g., Schein, 1983), routines (e.g., Stinchcombe, 1965) and performance (Eisenhardt and Schoonhoven, 1990). For task design, I hypothesize that larger entrepreneurial teams, in which members are generalists and

participate in decision making, will perform better than smaller entrepreneurial teams with member-specialists. One possible reason is that these conditions increase the chances that teams gain access to and are better able to combine different types of information, conditions that facilitate the discovery of new entrepreneurial opportunities (Kirzner, 1997). For processes, I hypothesize that team members should work towards common goals, identify strongly with the team and focus on task rather than non-task differences. This combination of factors increases the chance that member activities will contribute to the best entrepreneurial team performance.

The surprising finding of the study is that task design influences external evaluations, while team processes influence member evaluations. Both evaluations are important. Favorable evaluations by people outside the team increases the team's likelihood of getting external support (e.g., Roberts, 1991b), which in turn predicts future growth (Roberts, 1991b). Positive internal evaluations increase the chance that members will be satisfied with their teams and will be more apt to continue their team involvement (e.g., Hackman, 1987). Larger teams, in which members are generalists, predict higher external evaluations. However, participation in decision making does not lead to better externally evaluated performance. This finding would seem to be counterintuitive, because numerous studies (e.g., West and Anderson, 1996) have found team decision making to be beneficial in problem-solving tasks. One possible explanation for this finding is the ceiling effect—teams in this study have high levels of team decision making. Another possible cause is the high team identity and lower team conflict among teams that use participatory decision making. These conditions might cause teams to shut out dissenting views and become insular (Janis, 1982). Further studies can explore whether the ceiling effect or the effect of participatory decision making on team processes result in the nonfindings.

While task design influences external evaluations, the study finds that team processes influence member-ratings. Teams that have good internal task processes and high team identity are evaluated by members' more favorably. One possible reason is that members are aware of their internal processes and focus on them in evaluating their team's performance. This assertion is supported by Gladstein's (1984) finding that members' perceptions of team processes positively predicted evaluations of team performance. Similarly, Campion et al. (1996) argue that members' perceptions of internal processes result in perceptions of high-performance, even if such perceptions are not accurate. However, conflict does not influence performance and one possible reason is the low levels of conflict present in the teams—resulting in floor effects. Another possible reason is that the effect of conflict on performance is captured by the other process variables such as internal task processes and team identity (given the high correlations among these variables). Future studies should explore whether task processes, team identity and conflict are different team processes on parts of the same construct. In addition, since team members evaluate both team processes and performance, the effects of processes of performance could be due to common method bias. Future studies should get external evaluations of team processes through external observers or through weekly logs kept by team members.

While the entrepreneurial team has been a black box with most studies focusing on the individual founder (Cooper and Daily, 1996), this study in a semi-controlled environment together with a small number of extant studies on entrepreneurial teams (e.g., Vyakarnam et al., 1997), gives a peek into this black. The study makes the following contributions.

First, the study demonstrates that superior entrepreneurial team performance demands management of both team task design and team processes. Successful entrepreneurial teams are larger and assign tasks in which members are generalists rather than specialists. In addition, a

hybrid form of organizing is to divide tasks such that members are both generalists and specialists. Moreover, teams should encourage members to work towards common goals and to identity with the team. While some researchers focus on task design (e.g. Hackman, 1987) and others on team processes (e.g. Senge, 1991), this study shows that either approach alone is inadequate. The study also reveals that while task design influences external evaluations, team processes influence internal evaluations. Although both types of evaluations are important (Hackman, 1987), no research to my knowledge has shown how different team factors drive different types of performance.

Second, the study elucidates the interplay of different processes, showing that different processes can be combined. For example, instead of task, procedural and relationship conflicts that some researchers such as Jehn et al. (1997) have proposed, this study identifies two pivotal types of conflict, namely relationship and task conflicts, with the latter subsuming procedural conflict. Also significant, instead of a three-factor identity scale, this study uncovers a two-factor scale consisting of emotional and goal congruence identities with cognitive identity subsumed in these two factors.

Third, the study also finds high correlations between internal task processes and identity, and between internal task processes and conflict. Future studies should explore whether there is a more concise way to describe team processes. For example, it is conceivable that two factors might be sufficient to describe team processes. The first factor might be the extent to which members could rally around a common goal which might include elements from internal task processes, goal congruence identity and task conflict. The second factor might include the extent to which members could avoid nonproductive differences and this category could encompass elements from emotional identity and relationship conflict. Although separate analyses not

shown in this study did not arrive at this two-component structure, the high correlations among the different processes suggest that a more efficient description of team processes should be found.

To reiterate, this study finds that the design of tasks and processes influences short-term entrepreneurial team performance. The positive effects of design are assumed to be the result of how teams make use of information. However, one study's limitation is that it does not test a mediated model, with information as the mediating element, a task that must be left to future researchers. The study also highlights the need for development of a more parsimonious team processes model. Future studies can develop such a model, perhaps expanding on the two-factor model proposed here. However, this study concentrates on entrepreneurial teams at the early start-up phase and future studies can explore whether the effects of task design and processes on entrepreneurial team performance are the same at later stages of venture development. For example, when the venture's tasks become more routinized, it is likely that task specialization, rather than task generalization, would lead to higher performance since task generalization is preferred when knowledge is incomplete (the early start-up phase) and specialization is more efficient in areas where knowledge is well developed (the later start-up phase) (Alder and Borys, 1996). Another caveat is that the teams in this study are engaged in a business plan competition. Although this context resembles that of short-term entrepreneurial teams, future studies should replicate the study with other types of entrepreneurial teams.

Figure 4.1. *Hypothesized effects of internal factors on entrepreneurial team performance.*

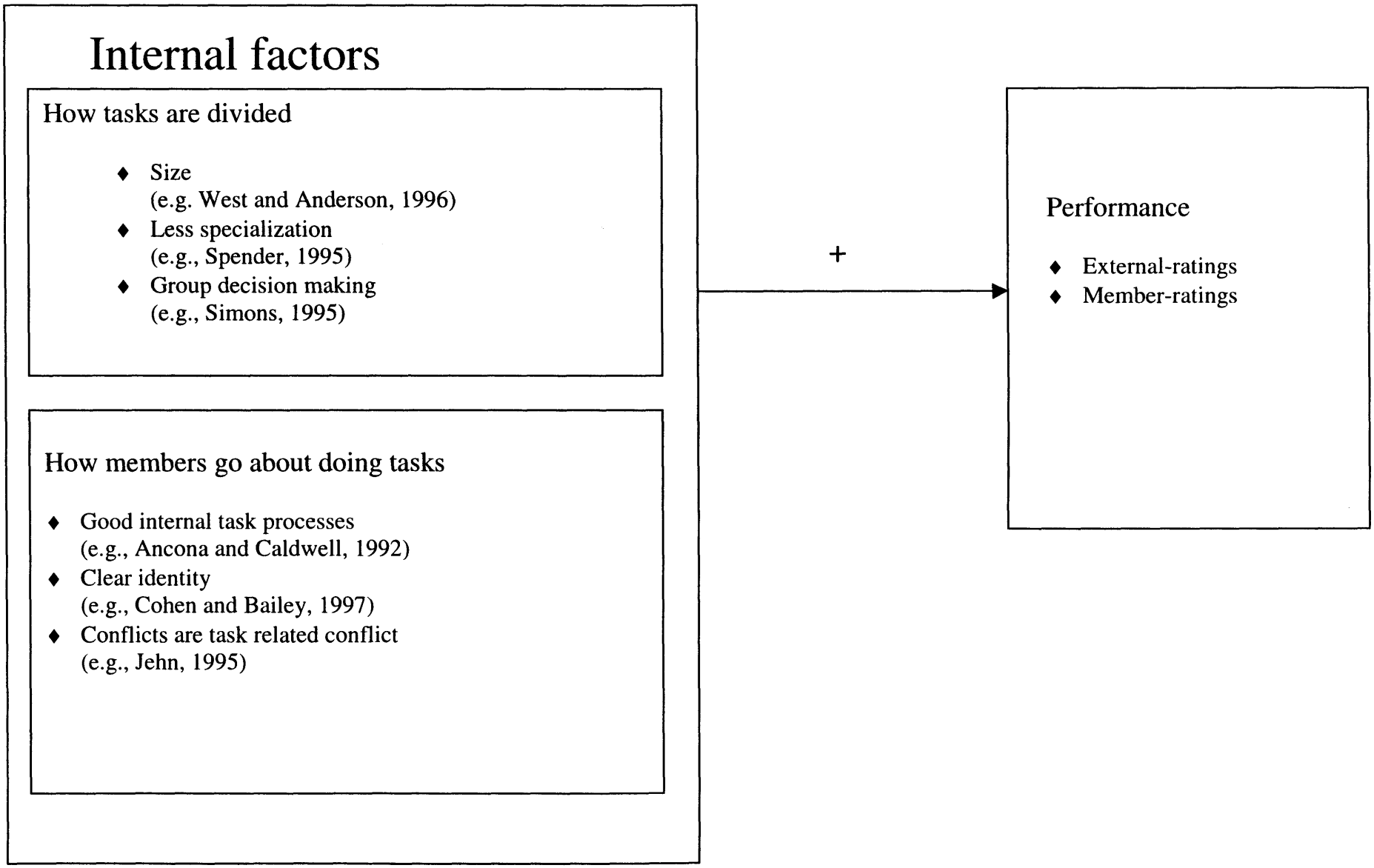


Table 4.1. Descriptive Statistics and Bivariate Correlations for the Dependent and Independent Variables

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Judges' Ratings of Performance (JudRate)	2.95	0.55	1.00														
2 Member-Ratings of Performance (MemRate)	4.93	0.66	0.24	1.00													
3 Size (Size)	4.05	1.80	0.19	-0.12	1.00												
4 Industry (Industry)	0.77	0.43	-0.40	-0.10	0.02	1.00											
5 Specialists (Spec)	0.31	0.22	-0.16	-0.11	0.36	-0.02	1.00										
6 Specialists and Generalists (SpecGen)	0.27	0.21	-0.06	-0.06	-0.25	0.20	-0.33	1.00									
7 Generalists (Gen)	0.42	0.25	0.19	0.15	-0.12	-0.14	-0.62	-0.54	1.00								
8 Participation in Decision Making (DmGrp)	3.56	0.89	0.17	0.33	0.00	-0.10	-0.17	0.16	0.01	1.00							
9 Emotional Identity (IdenEmot)	5.79	0.77	-0.07	0.60	-0.31	0.19	-0.15	0.31	-0.12	0.36	1.00						
10 Goal Congruence Identity (IdenIdGp)	6.16	0.68	0.02	0.45	-0.09	0.11	0.07	0.06	-0.12	0.34	0.60	1.00					
11 Internal Task Processes (Internal)	5.65	0.67	0.08	0.61	-0.25	-0.22	-0.15	0.07	0.08	0.33	0.53	0.33	1.00				
12 Task Conflict (ConfTsk)	2.66	0.75	-0.08	-0.47	0.24	0.14	-0.03	0.10	-0.06	-0.14	-0.49	-0.45	-0.52	1.00			
13 Relationship Conflict (ConfRel)	1.85	0.69	0.02	-0.43	0.23	0.00	0.12	-0.03	-0.09	-0.21	-0.48	-0.65	-0.37	0.66	1.00		
14 Identity (Identity)	5.95	0.66	-0.05	0.61	-0.25	0.17	-0.07	0.23	-0.13	0.38	0.94	0.83	0.51	-0.53	-0.61	1.00	
15 Conflict (Conflict)	2.29	0.64	-0.04	-0.50	0.26	0.08	0.04	0.05	-0.08	-0.18	-0.54	-0.58	-0.50	0.94	0.86	-0.61	1.00

Correlations of .24 and above statistically significant at $p < 0.05$ level (2-tailed)
Correlations of .33 and above statistically significant at $p < 0.01$ level (2-tailed)

Table 4.2. Regressions Predicting the Effects of Structure and Processes on Judges' Ratings of Entrepreneurial Team Performance

	Judges' Ratings of Performance											
	Model 1			Model 2			Model 3			Model 4		
	B	S.E.	t	B	S.E.	t	B	S.E.	t	B	S.E.	t
(Constant)	2.96	0.40 **	7.50	2.60	1.12 *	2.33	2.85	1.16 *	2.44	3.18	1.03 **	3.09
Industry	-0.52	0.14 **	-3.69	-0.53	0.16 **	-3.34	-0.52	0.16 **	-3.34	-0.54	0.16 **	-3.47
Size	0.09	0.03 **	2.57	0.07	0.04 †	1.80	0.09	0.04 *	2.48	0.09	0.04 **	2.53
Spec	-0.62	0.37 †	-1.67				-0.85	0.41 *	-2.07	-0.68	0.31 *	-2.23
SpecGen	0.03	0.31	0.10				-0.03	0.33	-0.08	-0.02	0.33	-0.07
DMGrp	0.06	0.07	0.84				0.04	0.08	0.56	0.05	0.08	0.63
IdenEmot				0.03	0.12	0.23	-0.03	0.12	-0.23			
IdenIndGp				0.07	0.13	0.54	0.15	0.14	1.08			
Internal				-0.02	0.12	-0.13	-0.07	0.12	-0.57	-0.05	0.11	-0.41
ConfTsk				-0.06	0.12	-0.52	-0.16	0.12	-1.33			
ConRel				0.08	0.14	0.55	0.17	0.14	1.26			
Identity										0.04	0.14	0.28
Conflict										-0.05	0.13	-0.40
R-sq		0.27			0.21			0.30			0.28	
F statistics		5.01 **			2.50 *			2.72 **			3.08 **	

**=p<.01, *=p<.05, †=p<.10

Table 4.3. Regressions Predicting the Effects of Structure and Processes on Members' Ratings of Entrepreneurial Team Performance

	Member-Ratings of Performance											
	Model 5			**Model 6**			**Model 7**			**Model 8**		
	B	**S.E.**	**t**	**B**	**S.E.**	**t**	**B**	**S.E.**	**t**	**B**	**S.E.**	**t**
(Constant)	4.46	0.41 **	10.81	1.13	1.05	1.08	0.86	1.05	0.82	0.47	0.98	0.48
Industry	-0.05	0.04	-1.06				0.04	0.04	1.08	0.03	0.04	0.91
Size	-0.05	0.18	-0.27	-0.14	0.15	-0.94	-0.11	0.15	-0.75	-0.10	0.15	-0.65
Spec	-0.19	0.38	-0.49				-0.30	0.30	-0.99	-0.35	0.29	-1.22
SpecGen	-0.51	0.40	-1.26				-0.68	0.32 *	-2.13	-0.63	0.31 *	-2.01
DMGrp	0.25	0.09 **	2.91				0.03	0.07	0.44	0.03	0.07	0.39
IdenEmot				0.28	0.11 **	2.51	0.37	0.12 **	3.09			
IdenIndGp				0.10	0.12	0.77	0.06	0.13	0.46			
Internal				0.33	0.11 **	2.92	0.32	0.11 **	2.76	0.34	0.11 **	3.15
ConfTsk				-0.04	0.11	-0.36	-0.02	0.12	-0.15			
ConRel				-0.05	0.13	-0.36	-0.05	0.13	-0.39			
Identity										0.46	0.13 **	3.52
Conflict										-0.04	0.12	-0.32
R-sq		0.15			0.50			0.55			0.54	
F statistics		2.29 †			10.98 **			7.53 **			9.53 **	

**=p<.01, *=p<.05, †=p<.10

CHAPTER 5

THE DIRECT AND INDIRECT EFFECTS OF FUNCTIONAL DIVERSITY ON ENTREPRENEURIAL TEAM PERFORMANCE

This chapter adds to the overall understanding of entrepreneurial team performance by studying how team composition, in particular functional diversity, influences team design, both task division and processes, that in turn influences team performance. It has long been argued that team composition, as defined in basic attributes, such as age, sex, educational level and race within a group of people, is related to team outcomes (e.g., Gladstein, 1984). Although many researchers have studied the direct effects of composition on performance (e.g., Pfeffer, 1983), several researchers (e.g., Ancona and Caldwell, 1992a) pointed out that the effects of composition on performance is both direct and indirect through team processes. Therefore, this paper explores both the direct and indirect effects of team composition on performance.

Pfeffer (1983) argues that it is important to study the diversity of a team's characteristics instead of the average level of a particular characteristic, because diversity affects how team members interact with one another, which in turn determines team outcomes. Focusing on diversity is also important for teams engaged in entrepreneurial tasks because it affects the type of information available to the team (Wiersema and Bantel, 1992) and information forms the basis of entrepreneurial opportunities (Kirzner, 1997). Since Pfeffer's (1983) article in the *Research in Organizational Behavior*, many studies in team composition have examined the effects of team-characteristic diversity on a number of outcomes including turnover (O'Reilly,

Caldwell and Barnett, 1989), innovation (Bantel and Jackson, 1989), diversification posture (Michel and Hambrick, 1992) and communication (Zenger and Lawrence, 1989).

The first contribution of this study is that it highlights that the effects of functional diversity on short-term entrepreneurial team performance depend on who makes the evaluation. Although functional diversity has no effect on externally-rated performance, it negatively predicts member-rated performance. Both internal and external evaluations are important: While positive external evaluations increase the chance that the business ventures get external support (Roberts, 1991b), positive internal evaluations increase the chance that members will be satisfied with their team involvement and will want to remain on their teams (e.g., Hackman, 1987). Second, while some studies (e.g., Watson et al., 1993) focus on the direct effects of diversity on performance without explicitly testing the indirect effects, this study shows that the effects of diversity on performance is mostly indirect, through team processes. Thus, it is important to study, which and in what ways team design mediates the effects of diversity on performance.

In the next two sections, I state the theoretical justifications for the effects of functional diversity on entrepreneurial team performance. Since there is limited research on entrepreneurial team performance (Cooper and Daily, 1996), the hypotheses are drawn from the entrepreneurship and team literatures. At the same time, insights from interviews with participants of this study are presented. The study focuses on decision making tasks instead of implementation tasks because the teams in this study are engaged in preparing a business plan—which is a complex decision making task. I hypothesize that diversity is beneficial to decision making tasks, because it increases the range of information available to the team, which in turn helps develop innovative decisions (e.g., Jackson et al., 1992). Although many types of diversity have been studied (e.g., age and gender), this study concentrates on functional diversity, because

some researchers argue that it is task-related diversity (e.g., Ancona and Caldwell, 1992a) that affects team performance. After hypothesizing the direct effects of functional diversity on entrepreneurial team performance, I explore the indirect effects of functional diversity. We need to study the indirect effects because diversity changes the way in which members interact with one another, and different modes of interaction ultimately influences team performance (Lawrence, 1997).

The study focuses on the indirect effects of team holding (Louis and Yan, 1996) and the extent of task specialization in the teams. Team holding is defined by Louis and Yan to include perceptions by team members of who is and who is not a member of the team, of how closely they work as a team and of their level of team identity. This construct was chosen for this study because it represented different aspects of team processes (namely, task processes and identity) found in the previous chapter to influence entrepreneurial team performance. Extent of member specialization was also chosen for the same reason that it was found to influence entrepreneurial team performance. In later sections of this paper, I describe the research methods employed for this study. I then describe the results, and in the last section, I discuss the findings.

DIRECT EFFECTS OF FUNCTIONAL DIVERSITY ON ENTREPRENEURIAL TEAM PERFORMANCE

Diversity and performance

The effects of diversity on performance have been studied for a long time. In 1959 for example, in a study called Change in Work Procedure, Hoffman found that diverse teams

produced more creative solutions than less diverse teams. Hoffman and Maier (1961) found that mixed-gender teams produced higher quality decisions than exclusively male or female teams. They concluded that the benefit of different perspectives on a problem results in higher quality decisions. Bantel and Jackson (1989), who studied innovation in the banking industry, found that more functionally diverse teams were more innovative. They concluded that functional diversity in top management teams is beneficial for innovation. Jackson (1992) argues that diverse groups outperform less diverse groups on tasks requiring judgmental decisions. Similarly, Ziller (1972) argues that diversity of team composition is positively associated with a wide variety of problem-solving tasks.

However, some researchers (e.g., Watson, Kumar and Michaelsen, 1993) have found negative effects of diversity on team performance. In studies relating to implementation tasks, more homogeneous teams have been found to perform better than diverse teams. For example, Ancona and Caldwell (1992a) found that product development teams with diverse functional backgrounds had lower team-rated and managerial-rated performance than less diverse teams. They speculated that diverse teams could be less effective during the implementation phase due to the lack of teamwork and integration among team members. Similarly, Finkelstein and Hambrick (1996) argue that homogeneous teams are able to rally around a shared understanding of what the organization needs to accomplish and that in turn increases the teams' capacity to implement their plans.

The above review suggests that when it comes to creative and complex decision making tasks, diverse teams perform better (e.g., Ziller, 1972) due to the diversity of perspectives in which the team members are exposed to (e.g., Bantel and Jackson, 1989). In implementation tasks homogeneous teams might be preferable, because commonalties improve members' ability

to coordinate team activities (e.g., Watson et al. 1993; Finkelstein and Hambrick, 1996). Since the teams in this study are involved in a decision making task, I expect that diverse teams would perform better than homogeneous teams.

Functional diversity and performance

Many facets of team diversity have been studied, including gender (e.g., Hoffman, 1959), age (Murray, 1989), culture (e.g., Watson et al., 1993) and cognitive styles (e.g., Volkemma and Gorma, 1998). This study, however concentrates on functional diversity which refers to differences in team members' task-related experiences, such as the area of work specialization (Bantel and Jackson, 1989). I focus on functional diversity because some researchers have shown that it is primarily function-related diversity that influences team performance (e.g., Ancona and Caldwell, 1992a). For example, Bantel and Jackson (1989) found that functional diversity had a positive effect on bank innovation. However, nonfunctional diversity of age and tenure diversity did not result in beneficial effects. In another study, Wiersema and Bantel (1992) found that corporate strategic change was positively associated with area of specialization, but not with age and tenure diversity. Similarly, Tsui et al. (1995) argues that it is task-related expertise that matters when it comes to team performance. In keeping with earlier studies on functional diversity, I focus on functional diversity as measured by the area of work specialization.

One member illustrated the disadvantages of not having diverse membership. He (INT 3) said that the "Strength [of the team is that] we all understand technology, but our weakness is that none of us have business experience. We had ideas that we knew were good but we don't have proven experience in selling our idea to someone else. We limited [member selection] to

people we knew. It probably would have benefited if we had a couple more people who were unknown, but had strengths [in other areas], and added more access to the markets."

Hypothesis 1: Entrepreneurial teams that are more functionally diverse, as represented by the area of work specialization, will have higher performance than entrepreneurial teams that are less functionally diverse.

INDIRECT EFFECTS OF FUNCTIONAL DIVERSITY ON ENTREPRENEURIAL TEAM PERFORMANCE

The above section argued that team functional diversity would have a direct impact on entrepreneurial team performance. This section explores the indirect effects of functional diversity on performance, first hypothesizing on the effects of functional diversity on team holding and extent of task specialization. Then I hypothesize about the effects of team holding and extent of task specialization on entrepreneurial team performance. We need to explore the indirect effects for two reasons. First, there are often competing explanations for the effects of diversity (Lawrence, 1997). For example, the advantage of diversity on performance could be due to the increased exchange of ideas among team members or the increased attraction which in turn results in greater effort put in by team members. Without a mediating approach, we cannot discover which competing explanations are empirically supported (Lawrence, 1997). Second, although there could be limited direct effects of diversity on entrepreneurial team performance, there is a greater likelihood of finding indirect effects, since even trivial differences can lead to

differences in the ways members interact with one another (e.g., Sachdev and Bourhis, 1991). In turn, patterns of interaction affect performance (e.g., Smith et al., 1994).

In this investigation, I use two types of mediating variables—level of team holding and extent of task specialization. Team holding includes perceptions by team members of who is and who is not a member of the team, of how closely they work as a team and of their level of team identity (Louis and Yan, 1996). Holding allows members to share a similar vision and develop specific symbols and language (Louis & Yan, 1996). I chose this dimension because holding affects members' ability to be open to outside information, and information absorption affects performance (e.g., Kirzner, 1997). I chose the extent of task specialization because the opportunity for members to bring their different perspectives to decisions has been shown to lead to better performance for teams engaged in innovative tasks (e.g., West and Anderson, 1996).

Effects of functional diversity on team holding

A boundary defines the team's identity as a distinct group, set apart from those outside in the broader environment (Arrow & McGrath, 1995) and marks who is and who is not a team member (Louis and Yan, 1996). The effects of diversity on team holding can be explained by the self-categorization theory (Tajfel, 1986), the basic premise of which is people desire to maintain a positive self-image. Positive self-image is created through comparisons of self with others and such comparisons mean that individuals must categorize themselves based on characteristics such as age, gender and area of work specialization. According to Tajfel and Turner (1986), people are inclined to view others who are similar to themselves positively and members of out-groups less favorably (Tajfel, 1986). Consequently, homogeneous groups tend to be more

cohesive (e.g., O'Reilly, Caldwell, and Barnett, 1989; Wiersema and Bantel, 1992) and members have greater feelings of psychological attachment to one another (Tsui, Egan and O'Reilly, 1992) – factors that should lead to higher levels of team holding.

The effects of diversity on turnover also provide indirect evidence of the effects of functional diversity on team holding. Research has consistently found turnover to be positively associated with diversity (e.g., Pfeffer and O'Reilly, 1987). For example, Pfeffer and O'Reilly (1987) found that the diversity of nursing staff date of entry positively predicted turnover. Wiersema and Bird (1993) studied diversity in top management teams as determined by age, organizational tenure, team tenure and the prestige of the university attended. They found that all these factors, with the exception of organizational tenure, predicted turnover. Alexander, Nuchols, Bloom and Lee (1995) note that a common explanation for the turnover is that diversity leads to differences in values and beliefs among members, which can create conflict and weaken integration among team members.

Consistent with the research that similarity increases cohesion (e.g., O'Reilly et al., 1989) and psychological attachment (e.g., Tsui et al., 1992) while lowering identity differences (e.g., Thomas-Hunt and Gruenfeld, 1998) and decreasing turnover (e.g., Pfeffer and O'Reilly, 1987), I expect functional diversity to result in lower team holding.

Hypothesis 2: Functionally diverse entrepreneurial teams have lower levels of team holding than less diverse teams.

Effects of functional diversity and extent of member specialization

A reason why diverse teams should have more specialization is suggested by the findings of Pelled et al., (1998), who discovered that team members exerted more influence in their areas of expertise. One possible effect of this tendency is that instead of working together, members would divide up tasks according to their areas of expertise. Indirect evidence of the effects of diversity on the extent of member task specialization is also provided by the decision making literature. Barsade et al. (1998) found that in diverse teams, members made use of more centralized decision making. The authors (1998) argue that diversity results in lower trust among other members and a consequence is that members are less willing to share their work with other team members.

The interviews illustrate the possibility of teams with diverse expertise using more specialization. One team member (INT 4) commented that "on the technical side of things, the technical people would make [the decisions] and on marketing things, Ben and I would be consulted with." Another team member (INT 6) said that "there was a lot of area-of-expertise kind of thing . . . One person had more of an Internet type background, so he looked at more of the technology side of things. I looked more at servers, and the last person did financial planning." A third member (INT 9) said that Harry "established his team as 4 engineers and 4 Sloanies [i.e., students in the MIT Sloan business school] and the engineers will take care of the hardware and the software and the Sloanies will take care of the business plan and dealing with marketing and the business side of it." I therefore hypothesize that:

Hypothesis 3: Entrepreneurial teams that are functionally diverse specialize more than homogeneous entrepreneurial teams.

Effects of team holding and extent of task specialization on entrepreneurial team performance

Louis and Yan (1996) define team holding to be the extent members view themselves to be a team that works closely together with a sense of identity and knowledge of who is and is not a member of the team. Team holding is expected to have a curvilinear effect on team performance. Too little holding could be detrimental for team performance, because teams that are more socially integrated are more efficient in coordinating team tasks (Shaw, 1981). Similarly, Ancona and Caldwell (1992b) argue that holding helps members work towards similar objectives. However, they caution that too much holding could hurt performance because such teams might be less open to outside influences (Ancona and Caldwell, 1992b) and found team cohesion to be negatively associated with Scouting activities (defined as general scanning of the environment). Similarly, Ancona (1990) found that teams who stressed the importance of making external connections tended to have lower team cohesion.

Although no one to my knowledge has directly studied the effects of team holding on performance, the groupthink phenomenon gives indirect evidence of the effects of excessive team holding on team performance. According to Janis (1982), teams that are overly cohesive could face problems of groupthink; the symptoms are an overestimation of team capabilities, closed-mindedness to new or differing information and pressures toward uniformity. These in turn lead to an incomplete survey of available options for the team, failure to assess the risks

associated with the preferred option and a selective bias in information processing. Reviewing the groupthink literature, Gladstein and Reilly (1985) note that groups facing groupthink censor the input of dissenting views and insulate themselves from differing opinions, from both outside and inside the team. Subsequently, teams that experience groupthink are defective in decision making.

While teams that have too little holding may not be able to function effectively as one unit and consequently perform poorly (Louis and Yan, 1996; Ancona and Caldwell, 1992b), teams that have too much holding become less open to outside influences (Louis and Yan, 1996; Ancona, 1990) and thus might also perform poorly. Within the range of team holding in entrepreneurial teams, higher levels of team holding should result in lower performance, because people tend to choose those who are similar to themselves to be teammates (e.g., Westphal and Zajac, 1995). These factors in turn lead to high cohesion (e.g., O'Reilly et al., 1989), and attachment (e.g., Tsui et al., 1992)—factors which are related to high levels of holding.

Although the interviewees did not mention the effects of holding on performance, their statements support the assertion that entrepreneurial teams are likely to have high levels of holding. For example, one team member (INT 13) said, "We interviewed [for new members] at Au Bon Pain, in the middle of February. We were looking for various people . . . Mandy was the first person who got in contact with us and the reason she was interested was because [like us] she believed in medical products . . . This is one area which she thought was moving and when we talked to her she understood our idea." Another interviewee said that the team was founded when "two guys met in MIT, . . . and the third person is a friend of the guy at IDE. And I am also a friend of this guy from IDE. So it is more like a friend's friend and friend kind of thing."

Hypothesis 4: Within the range of team holding in entrepreneurial teams, teams with lower levels of team holding is expected to perform better than teams with higher levels of team holding.

In the previous chapter, I argued that entrepreneurial teams that divide tasks such that members are generalists should perform better than teams with members as specialists. This is because in non-routine tasks, task generalization enables team members to better understand the issues faced by the team as a whole (Van de Ven, 1986) and that in turn improves team performance (Alder and Borys, 1996; Spender, 1995).

Hypothesis 5: Entrepreneurial teams in which specialize are expected to perform worse than entrepreneurial teams with more member generalization.

A summary of the hypothesis on the direct and indirect effects of functional diversity on team performance is shown in figure 5.1.

INSERT FIGURE 5.1 HERE

RESEARCH METHOD

Sample and procedure

The sample comprised the 73 teams who participated in the MIT $50K Competition in 1998. Of the team members, 257 out of 310, or 83 percent, returned the questionnaire. No statistical

differences was found between the respondents and non-respondents in the dimensions of age, sex, and team size, suggesting that the sample was representative of all the participants in the MIT $50K Competition for that year.

Operationalization of independent variables

Team holding

Louis and Yan's (1996) measure of team holding was used. Respondents rated their agreement on a scale of 1 to 7 with 1 meaning disagree to a large extent and 7 agree to a large extent. The scale comprised the questions: "It often hard to figure out who is and who is not a member of this team" (reverse coded); "Members of this team clearly view themselves as a team of people who work closely together, not as a collection of individuals who have their own particular job to do"; "This team tried to create a clear sense of identity and purpose"; and "This team made an effort to develop an image that distinguishes it from other teams." The Cronbach alpha for the pre-test of this scale during the MIT $1K Competition was 0.77. The Cronbach alpha for the MIT $50K sample was 0.71. The level of team holding was calculated by averaging members' response to the four scale items. One-way ANOVA showed that the mean square of error between and within teams for the scale were 2.05 and 1.03 respectively, statistically significant at $p<0.01$. This suggested within team agreement on the level of team holding, providing some support for averaging individual member scores to a team score.

The effect of team holding on entrepreneurial team performance is expected to be curvilinear; teams with too low holding are unable to work towards a common direction (e.g., Ancona and Caldwell, 1992) while teams with too high holding are less open to dissenting views

and outside sources of information (e.g., Janis, 1982). However, in this study I only modeled a first-order relationship between team holding and performance. This was because entrepreneurial teams are founded teams where members select who they want to be team members. These teams are expected to have high holding (see Shah and Jehn, 1993 asserting that people tend to associate with others who are their friends) and consequently, higher levels of holding would be detrimental to entrepreneurial team performance. In addition, in this study the average team holding was 5.3 with a standard deviation of 0.86. Given the high levels of team holding, and relatively low range of this variable, the correlation between team holding and its square term was 0.995. Thus, in this study, it was not possible to empirically disentangle the curvilinear effects of team holding on entrepreneurial team performance.

Level of specialization

As noted in the previous chapter, the questionnaire asked participants to evaluate whether each team member was a specialist, a generalist or both. The level of specialization was calculated by averaging the number of responses to that category.

Diversity of functional expertise

Diversity of functional expertise (Functional Diversity), as determined by the area of work specialization, was measured using the Herfindal-Hirschman index. This is a commonly used measure (controlling for team size) to determine diversity of categorical variables (e.g., Hambrick et al., 1996).

$$H = 1 - \Sigma p_i^2$$

Where H is the diversity measure (the higher, the more diverse) and P is the proportion of team members in each category.

As part of the entry requirement, each team member had to submit a copy of his or her resume to the competition organizers. From the resumes, I coded the participants' most recent area of work into the categories of engineering, computer or management. The coding scheme was adapted from Hambrick et al. (1996) who had the categories of management, technology, information systems or engineering. Eighty seven percent of the participants' area of work specialization fell within one of the three categories developed for this study. The areas of work specialization for the other participants were coded as others. Since I did the coding alone, no reliability statistics are reported. However, most of the statements were short, about a phase long, and not ambiguous.

Operationalization of control variables

Team size

Teams participating in the competition had to submit a form to the competition organizers listing the members of their teams. The number of members listed in the form was used to determine team size. I controlled for size because small teams of two to three members lacked diversity of information for innovation while large teams of above 12 to 13 people would

be too unmanageable for good information exchange (West and Anderson, 1996). Although the effects of team size on performance is expected to be curvilinear, in this study, I modeled a first order effect of size on entrepreneurial team performance. This was because empirical research on entrepreneurial teams showed that these teams tended to be small, ranging from two (Roberts, 1991) to four (e.g., Chandler and Hanks, 1998; Vyakarman, Jacobs and Handelberg, 1997). In this study, the average team size was four with 95 percent of teams with seven or fewer members. In addition, given the small range of team size, there was high correlation between team size and the square of team size of r= 0.97. Thus, in this study, it would not be possible to empirically detect the curvilinear effects of team size on entrepreneurial team performance.

Diversity of managerial level

I controlled for the managerial level because this factor had been found by Stuart and Abetti (1990) to predict entrepreneurial performance. Following Pfeffer's (1983) argument that it is the extent of diversity that influences performance, I calculated the diversity of managerial level using the Herfindal-Hirschman index. I placed it as a control variable instead of a predictor variable because few studies, both in the entrepreneurship and in the team literatures, have explored how differences in levels of managerial experience influenced entrepreneurial performance. The managerial level was coded from the participants' most recent job listed in the resumes. The level of managerial level was coded as 3 for members with founding experience or with job titles of executive vice presidents and above; 2 for members who are in middle management, e.g., bank manager; and 1 for people with general work experience, e.g., store clerk and students doing internships.

Although it is likely that other factors can influence entrepreneurial team performance, given the limited sample size and the exploratory nature of this study, only these three variables were controlled.

Industry control

I controlled for industry since investors preferred some industries for early financing (Haar, Starr and MacMillan, 1988). Teams that were involved in technology products or services were given the code of 1 and the rest with a code of 0. Although a more refined measure—comprising more categories—could lead to a better understanding of the attractiveness of different industries, the small sample size limited the number of categories I could include.

RESULTS

Table 5.1 reports the correlations among the independent and dependent variables. None of the correlations were above 0.6 level where multicollinearity problems might be present (Kennedy, 1992).

INSERT TABLE 5.1 HERE

In the area of functional expertise, 30 percent of the respondents had worked in the computer area, 24 percent in engineering, 12 percent in management and 13 percent in other areas. The correlations showed that functional diversity positively correlated with judges' ratings

(r=0.13) but negatively with member-ratings (r=-0.05). However, both correlations were not statistically significant at $p<0.05$.

I hypothesized that the effects of functional diversity on entrepreneurial team performance depended on the direct effects of diversity on performance and the indirect effects through team holding and extent of task specialization. To test these hypotheses, two sets of regressions are required: First, the direct effects of the predictor and mediating variables on performance and second, the effects of the predictor variables on the mediating variables. The first set is presented in Models 1 to 6. Model 1 regressed the control variables of size, industry and diversity of managerial level on judges' ratings. Model 2 added the predictor variable—functional diversity. Model 3 regressed the effects of the control, predictor and mediating variables on judges' ratings. Models 1 to 3 are presented in Table 5.2. Models 4 to 6 presented in Table 5.3 were similar to Models 1 to 3 except that the dependent variable was members' performance ratings. The second step—the effects of functional diversity on the mediating variables—is presented in Models 7 and 8 (shown in Table 5.4). Model 7 and 8 regressed the effects of functional diversity on team holding and extent of member specialization. respectively.

INSERT TABLE 5.2 HERE

Model 1, with R^2 of 0.20 ($F=5.73$, $p<0.01$) showed that the control variables of size (beta=0.20, t=1.84, $p<0.10$) and industry (beta=-0.40, t=-3.62, $p<0.01$) both predicted judges' ratings. Reasons for these findings are discussed in the next section. However, the control variable of diversity of managerial level (beta=-0.00, t=-0.02, n.s.) did not predict judges' ratings. Model 2, with R^2 of 0.20 ($F=4.00$, $p<0.01$) showed that functional diversity (beta=0.07,

t=0.51, n.s.) did not predict judges' ratings. Thus, hypothesis 1 that functionally diverse entrepreneurial teams would have higher performance than more homogeneous teams was not supported. Model 3, regressed the control, functional diversity, and mediating (i.e. team holding and extent of specialization) variables on judges' ratings. The model with R^2 of 0.28 (F=4.18, p<0.01) did not support hypothesis 4 that entrepreneurial teams with lower levels of team holding would perform better than entrepreneurial teams with higher levels of team holding (beta=-0.07, t=-0.57, n.s.). Hypothesis 5 that teams with more member specialization performed worse than teams where members generalized was supported (beta=-0.28, t=-2.42, p<0.05). Overall, the findings suggested that functional diversity did not directly predict judges' ratings. However, there was support for the hypotheses that how members divided tasks predicted judges' ratings.

INSERT TABLE 5.3 HERE

Models 4 to 6 explored the direct effects of functional diversity on member ratings of performance. Model 4, which included only the control variables had a low R^2 of 0.03 (F=0.60, n.s.). The model showed that size (beta=-0.87, t=-0.64, n.s.), industry (beta=-0.11, t=-0.89, n.s.) and diversity of managerial level (beta=-0.05, t=-0.40, n.s.) did not predict member ratings. Model 5, with R^2 of 0.03 showed that functional diversity and the control variables did not predict member ratings. The betas were -0.09 (t=-0.63, n.s.) for size, -0.12 (t=-0.92, n.s.) for industry, -0.07 (t=-0.48, n.s.) for diversity of managerial level, and -0.04 (t=-0.30, n.s.) for functional diversity. Thus, no support was found for hypothesis 1 that predicted positive direct effects of functional diversity on performance. Model 6 added the mediating variables of team

holding and extent of member specialization. The R^2 of the model was 0.25 (F=4.04, p<0.01). The change in R^2 was statistically significant from Model 5 at the p<0.01 level. This suggested that the mediating variables collectively influenced member ratings of performance. The coefficient of team holding (beta=0.51, t=4.43) was statistically significant at p<0.01. This showed that higher levels of team holding positively predicted member-ratings—the opposite direction predicted in hypothesis 4. Reasons for this finding are discussed in the next section. Hypothesis 5 that entrepreneurial teams with more specialization would perform worse than teams that divided tasks with members as generalists was not supported (beta=-0.15, t=-1.26, n.s.). However, the coefficient was in the direction predicted. Overall, the findings in Models 4 to 6 were similar to that of Models 1 to 3 that functional diversity did not have a direct effect on performance while how members interacted influenced performance.

INSERT TABLE 5.4. HERE

Models 1 to 6 above explored the effects of the variables on entrepreneurial team performance. Models 7 and 8, explored the effects of functional diversity on the mediating variables of team holding and extent of member task specialization. Covariance structure analysis, such as LISREL, was not used because the team level variables were aggregated from individual level responses and covariance structure analysis is not able to handle two different levels of analysis at the same time (Smith et al., 1994). Model 7 regressed the effects of the control variables (size, industry and diversity of managerial level) and functional diversity on team holding. The model, with an R^2 of 0.15 (F=2.99, p<0.05) supported hypothesis 2 that functionally diverse entrepreneurial teams had lower levels of team holding than homogeneous

teams (beta =-0.28, t=-2.17, $p<0.05$). As shown in Model 8, hypothesis 3 that more functionally diverse teams had less member specialization was not supported (beta = 0.12, t=0.91, n.s.). Overall, Models 1 to 8 suggested that functional diversity had an influence on entrepreneurial team performance through team holding. The results of the findings are discussed in the next section.

DISCUSSION AND CONCLUSION

In this study, I argue that function diversity is beneficial to short-term entrepreneurial team performance because more perspectives are available to the team leading to better team decisions. Although functional diversity has been extensively studied (e.g., Bantel and Jackson, 1992), this study adds to the literature by studying not only the direct and indirect effects, but also both internal and external evaluations of performance. The results of the study are summarized in figure 5.2. Among the control variables, a surprising finding is that people outside the team evaluate teams in the high-technology area less favorably than teams in other areas. One explanation is that some teams focus on the technology instead of conceptualizing a business model. The judges commented that some teams were interested in "technology plays" without a clear revenue model. For example, a judge commented that a particular plan was based "on a technology, not a product or a solution . . . [and] this is a common problem in plans developed by technically-oriented engineers. " Another judge said that "it is almost given that the technology works; it's the selling and the personnel who can do it that differentiates one plan from another." The control variables also show that team size positively predicts external evaluations. One reason for the finding is that entrepreneurial teams are small (e.g., Roberts,

1991a). Thus, within the range of size in entrepreneurial teams, larger teams will have access to more information without the process losses associated with larger teams (West and Anderson, 1996).

INSERT FIGURE 5.2 HERE

Hypotheses 1 through 3 explore the direct effects of functional diversity on entrepreneurial team performance, team holding and extent of task specialization. As shown in figure 5.2, only indirect effects of functional diversity on entrepreneurial team performance are found. Thus hypothesis 1 is not supported. Hypothesis 2, that functional diversity leads to lower levels of team holding, is supported. However, hypothesis 3 that functionally diverse teams are more likely to divide tasks with members as specialists is not supported. One reason that functionally diverse teams do not specialize more is provided by Williams (1998) who found that when team members expect differences in opinions, such as the case when they have functional differences, they are more willing to engage other members to discuss such differences (Williams, 1998).

Hypotheses 4 and 5 explore the effects of the mediating variables (i.e., team holding and extent of task specialization) on entrepreneurial team performance. Hypothesis 4 predicts that entrepreneurial teams with lower holding will perform better than entrepreneurial teams with higher holding because founded teams—such as entrepreneurial teams—are expected to have high levels of holding (see Shah and Jehn, 1993). That in turn could reduce members' acceptance of dissenting views and outside information (Janis, 1982). As shown in figure 5.2, the surprising finding is that the effects of team holding on entrepreneurial team performance depend on who

makes the evaluation. The results show that higher levels of team holding positively predict internal evaluations of performance but team holding does not predict external evaluations of performance. Although team holding does not predict external evaluations, one possible reason it positively predicts internal evaluations is that members use perceptions of team functioning to infer how well the team performs, equating good processes to good performance. This assertion is supported by Gladstein's (1984) finding that members' perceptions of team processes positively predicted their evaluations of team performance. Similarly, Campion et al. (1996) argue that members' perceptions of good internal processes result in perceptions of high-performance, even if such perceptions are not accurate.

Hypothesis 5 predicts that entrepreneurial teams that divide tasks with members as specialists will perform better than entrepreneurial teams with members as generalists because in non-routine activities, task generalization allows members to better understand team issues (Van de Ven, 1986) resulting in better decisions. This hypothesis is partially supported with task specialization negatively predicting performance for externally-rated performance but no support is found for member-rated performance.

Overall, as shown in figure 5.2, the effects of functional diversity on team holding (hypothesis 2) and that of team holding on entrepreneurial team performance (hypothesis 4) suggests that functional diversity affects entrepreneurial team performance through team holding. Through team holding as a mediator, functionally diverse teams, compared to more homogeneous teams, are evaluated by members less favorably. However, there is no difference in externally-rated performance for diverse and homogeneous teams.

The study makes the following contributions. First, it extends our understanding of how team composition influences the performance of entrepreneurial teams by showing that

functional diversity could lead to different internal and external evaluations of entrepreneurial team performance. Both evaluations are important because teams that are evaluated favorably by people outside the team are more likely to get external support that in turn predict future growth (Roberts, 1991b) and internal evaluations increase the chance that members continue their team involvement (Hackman, 1987). Many popular books on how to build successful start-ups (e.g., Timmons, 1977) have focused on the need to build functionally diverse teams. This study shows little evidence to substantiate this argument (as evaluated by people outside the team) and indeed diverse teams may have worse team processes leading to less favorable internal evaluations. The second contribution of this study is that it shows the need to study the mediating effects of diversity. Some researchers such as Pfeffer (1983) argue that more "objective" variables such as team member demographics should be used to determine the effects of diversity on performance without the need to measure "subjective" variables such as team processes. Contrary to Pfeffer's (1983) argument, this study finds no direct effects of diversity on performance; however indirect effects are found. In addition, the study shows that while team holding mediates the effects of functional diversity on performance, extent of task specialization does not.

One limitation of this study is that the high levels of team holding coupled with limited variance in this variable makes it statistically not possible to model the curvilinear effects of holding on performance. As noted earlier, this weakness is expected in self-selected teams, such as entrepreneurial teams, because of the way members select potential team members. Future studies using a laboratory approach can test for curvilinear effects. For example, some teams can comprise members with similar interests (high holding condition) while other teams can comprise members with few common interests (low holding condition). Another limitation of

this study is that it focuses on the effects of functional diversity on short-term entrepreneurial teams. Future studies can explore the effects of functional diversity on entrepreneurial teams at later stages of development. For example, when the venture is implementing its plan, a homogeneous team may perform better than a diverse team since a homogeneous team is better at coordinating activities (Finkelstein and Hambrick, 1996). Further, this study focuses on two mediating variables—team holding and extent of member task specialization. Future studies can explore the effects of functional diversity on other processes. For example, researchers have argued that diversity influences team communication (Zenger and Lawrence, 1989) and in turn communication could influence performance through the type and amount of information exchanged among team members.

Figure 5.1. Hypothesized Direct and Indirect Effects of Functional Diversity on Entrepreneurial Team Performance.

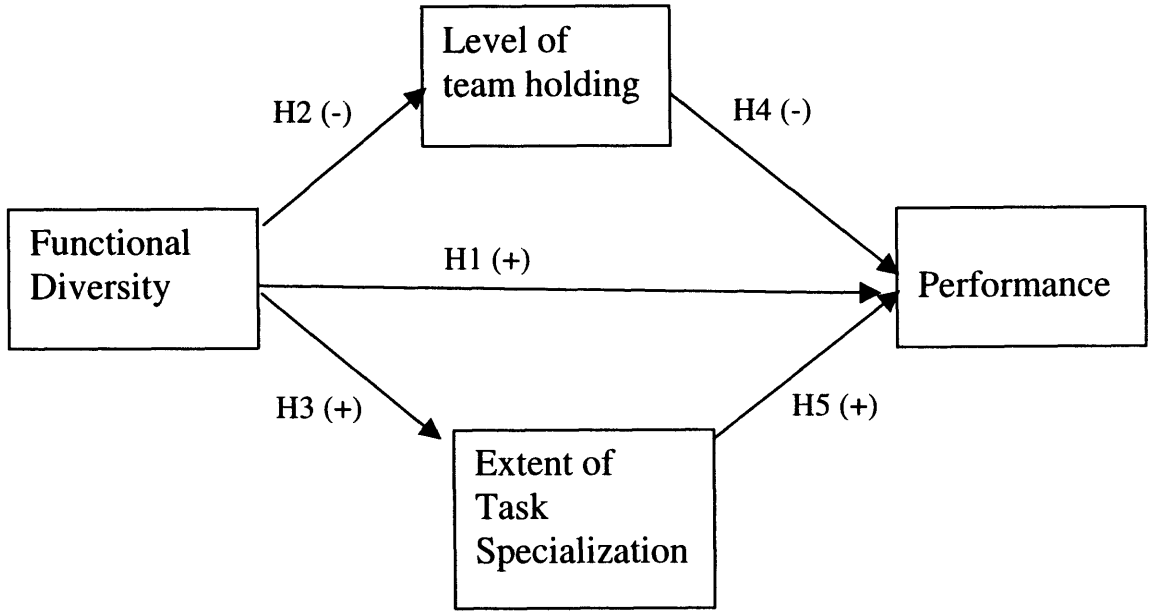
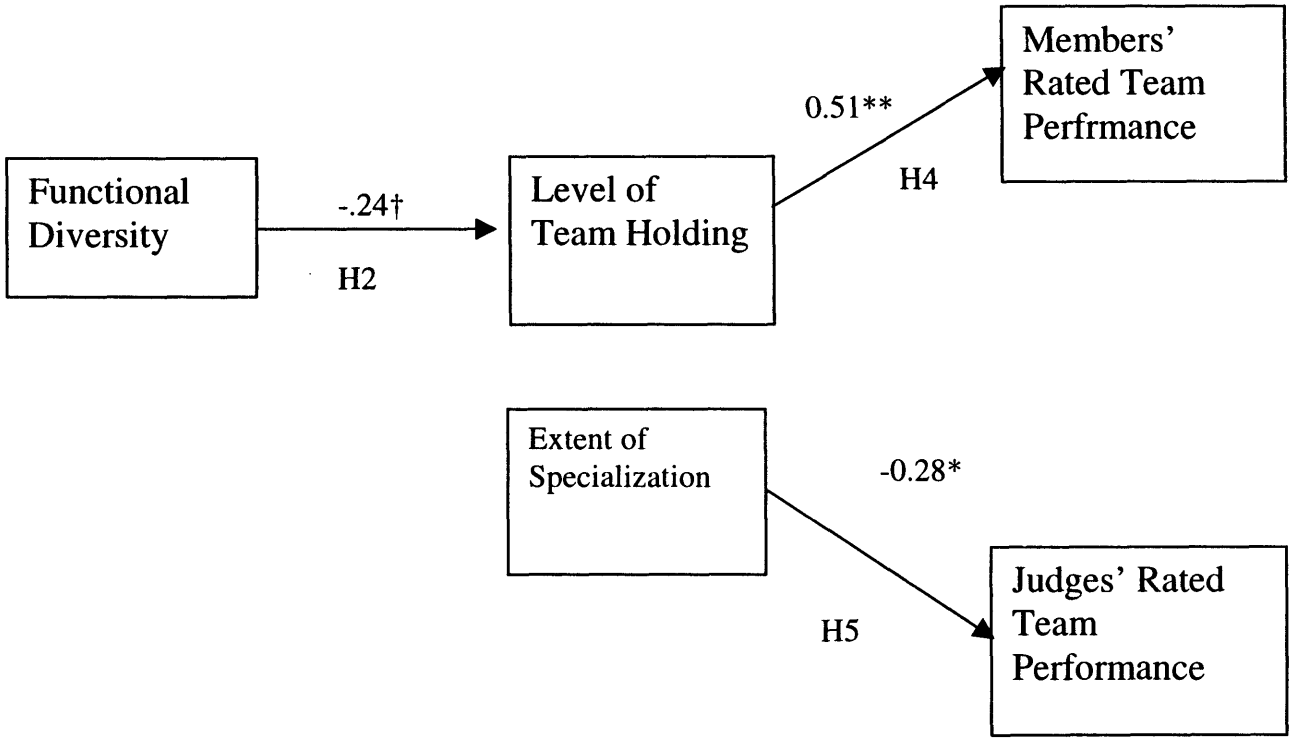


Figure 5.2. Effects of Functional Diversity on Entrepreneurial Team Performance.



† statistically significant at p<.10

**statistically significant at p<.01

Table 5.1. Descriptive Statistics and Bivariate Correlations for the Dependent and Independent Variables.

	Mean	S.D	1	2	3	4	5	6	7	8
1 Judges' Ratings (JudRate)	2.94	0.55	1.00							
2 Members' Ratings (MemRate)	4.93	0.66	0.22	1.00						
3 Size (Size)	4.05	1.80	0.19	-0.12	1.00					
4 Industry (Industry)	0.77	0.43	-0.40	-0.10	-0.01	1.00				
5 Mangerial Level Diversity (CoyLvl)	0.68	0.31	0.13	-0.04	0.20	-0.21	1.00			
6 Functional Diversity (CoFunc)	0.60	0.22	0.13	-0.05	0.37	-0.04	-0.26	1.00		
7 Team Holding (Hold)	5.27	0.86	-0.17	0.46	-0.32	-0.04	-0.15	-0.28	1.00	
8 Extent of task specialization (Spec)	0.31	0.22	-0.16	-0.11	0.36	-0.02	0.09	0.22	-0.02	1.00

* Correlations of .19 and above are significant at the 0.05 level (2-tailed).

** Correlations of .27 and above are significant at the 0.01 level (2-tailed).

Table 5.2. Effects of Functional Diversity on Judges' Ratings of Entrepreneurial Team Performance.

Variables	Model 1			Model 2			Model 3		
	B	(S.E.)	t	B	(S.E.)	t	B	(S.E.)	t
Size	0.20	0.03 †	1.84	0.16	0.04	1.24	0.25	0.04 *	1.97
Industry	-0.40	0.14 **	-3.62	-0.38	0.15 **	-3.37	-0.40	0.14 **	-3.63
CoyLvl	0.00	0.20	-0.02	0.07	0.32	0.51	0.02	0.22	0.20
CoFunc				0.03	0.22	0.26	0.08	0.32	0.64
Hold							-0.07	0.07	-0.57
Spec							-0.28	0.29 *	-2.42
R^2		0.20			0.20			0.28	
F-stats		5.73 **			4.00 **			4.18 **	

**=p<.01, *=p<.05, †=p<.10

Table 5.3. Effects of Functional Diversity on Members' Ratings of Entrepreneurial Team Performance.

Variables	Model 4			Model 5			Model 6		
	B	(S.E.)	t	B	(S.E.)	t	B	(S.E.)	t
Size	-0.87	0.04	-0.64	-0.09	0.05	-0.63	0.02	0.05	0.15
Industry	-0.11	0.19	-0.89	-0.12	0.19	-0.92	-0.10	0.17	-0.91
CoyLvl	-0.05	0.27	-0.40	-0.07	0.29	-0.48	0.07	0.27	0.54
CoFunc				-0.04	0.42	-0.30	0.12	0.39	0.93
Hold							0.51	0.09 **	4.43
Spec							-0.15	0.35	-1.26
R^2		0.03			0.03			0.25	
F-stats		0.60			0.46			4.04	

**=p<.01, *=p<.05, †=p<.10

Table 5.4. Effects of Functional Diversity on Team Holding and Extent of Task specialization

Variables	Model 7 Team Holding			Model 8 Extent of Specialization			
	B	(S.E.)	t	B	(S.E.)		t
Size	-0.12	0.06	-0.94	.30	0.02	*	2.36
Industry	-0.03	0.24	-0.25	-0.01	0.06		-0.62
CoyLvl	-0.24	0.36 †	-1.89	0.62	0.09		0.48
CoFunc	-0.28	0.51 *	-2.17	0.12	0.13		0.91
R^2		0.15			0.14		
F-stats		2.99 *			2.76 *		

**=p<.01, *=p<.05, †=p<.10

CHAPTER 6

EFFECTS OF MEMBER INTERACTIONS WITH EXTERNAL CONTACTS ON ENTREPRENEURIAL TEAM PERFORMANCE

While the earlier chapters show how factors within the team influence performance, this paper explores the effects of external contacts on short-term entrepreneurial team performance. The need to study external contacts is shown in the social capital literature. According to social capital theorists, information is embedded within and derived from network of relationships (Nahapiet & Ghoshal, 1998:243). Through contacts with others, individuals can be positioned to gain informational benefits and thereby gain entrepreneurial opportunities (Powell, 1990). This study concentrates on the need to gather the right information, from the right people and as efficiently as possible. The reason for this need is that information forms the basis for entrepreneurial opportunities (e.g., Kirzner, 1997).

This study shows, not merely that external contacts matter, but that who team members interact with influences performance. While previous studies have shown that having more external contacts is beneficial to team performance (e.g., Nahapiet & Ghoshal, 1998), these studies have not demonstrated the types of interactions that matter. Second, the study extends both the team and social capital literature by integrating social capital concepts into the team literature. Most studies on social networks have focused at the individual (e.g., Granovetter, 1973) or at the organizational (e.g., Soh and Roberts, 1998) levels. However, researchers have for the most part, ignored social capital concepts at the team level. This study shows that social

capital concepts, such as strong and weak ties, are equally applicable to the team level of analysis.

Consistent with Kirzner's (1997) argument that information is the basis for entrepreneurial opportunities, I hypothesize that entrepreneurial teams that are able to gather a wide range of information should perform better than entrepreneurial teams that gather only a narrow range of information. I focus on information related to the task of preparing a business plan. Since this task requires a holistic approach that conceptualizes a whole business model (Olive, 1996), I hypothesize that teams that are able to get assistance from external contacts with broad perspective should perform better than teams with assistance from people with a narrow perspective. Although I expect information from social contacts to improve entrepreneurial team performance, entrepreneurial teams often have limited resources (e.g., Casson, 1982). Therefore, I expect that entrepreneurial teams that are able to gather information efficiently will perform better than entrepreneurial teams that are less efficient in information gathering. Granovetter (1973) argues that getting information from weak ties—which he defines as the combination of time spent with, emotional intensity and level of intimacy with external contacts—is more efficient than getting information from strong ties. Individuals tend to move in different social circles from those with whom they have weak ties (Granovetter, 1973). Consequently, information from weak ties is likely to be more novel than information from strong ties (Granovetter, 1973). I therefore hypothesize that entrepreneurial teams that engage weak ties perform better than entrepreneurial teams that engage strong ties.

The paper proceeds as follows: In the next section, I develop the theoretical arguments in support of the hypotheses. Since there is limited research on entrepreneurial teams (Cooper and

Daily, 1996), the hypotheses are drawn from the team, entrepreneurship and social capital literatures. At the same time, insights from interviews with participants of this study are presented. Then I describe the research methods and report the findings. Finally, I discuss the findings and provide conclusions on how entrepreneurial teams can engage external contacts to improve team performance.

THEORY DEVELOPMENT

According to Venkataraman (1997), entrepreneurship is the process where "future goods and services are discovered, created and exploited (Venkataraman, 1997:120)." Drawing from Kirzner (1997), Shane and Venkataraman (forthcoming) argue that entrepreneurial opportunities exist because of information asymmetry, and those who have access to more information are better able to discover entrepreneurial opportunities. They add that an entrepreneurial act occurs when someone has an insight that "Some resources are priced 'too low', given the price at which the output from their combination could be sold in another location, at another time, or in another form." This insight in turn requires the possession of private information about the opportunity.

Range of information gathered and performance

While social contacts are by themselves important, Burt (1992) argues that to get information advantages, we should be able to broker across different information channels. Moving in different social circles is advantageous because information from people of different

circles is less likely to be duplicative. By having and combining different types of information, entrepreneurial opportunities can be obtained (Nahapiet & Ghosal, 1998, Kirzner, 1997).

Indirect evidence of the benefits of a diverse range of information is also suggested by the decision making literature. West and Anderson (1996), who studied the effects of member participation in decision making on team performance, found that having diverse information increases the level of team innovation. Similarly, the conflict literature also provides indirect evidence for the benefits of getting diverse information. According to Mitroff (1982), having a diversity of views enables team members to challenge existing ideas, which leads to a better understanding of the issues (Eisenhardt, Kahwajy and Bourgeois, 1997).

However, not all types of information may be relevant to an entrepreneurial team. Some researchers (e.g., Ancona and Caldwell, 1992a) argue that the types of resources that are beneficial to teams should be those that are task relevant. Similarly, in studies relating to team composition, Tsui et al. (1995) argue that it is task-related expertise that matters to team performance. Teams in this study are engaged in the task of preparing a business plan. According to Olive (1996), a business plan is a document that conceptualizes the totality of a business opportunity. The plan gives people who are interested in the business the chance to form strategies in areas such as marketing, finance and operations. It also allows potential entrepreneurs to think through critical business decisions and to decide whether they have a viable business. Given the need for a business plan to cover a wide range of functional areas, I expect that entrepreneurial teams that are able to gather information from this wide range of functional areas would perform better than entrepreneurial teams that gather a narrow range of information related to preparing a business plan.

The comments of the competition judges also suggest that a range of information related to a business plan is required. For example, one judge said, "I have to be able to read this once and understand what the business is about. Included in this, I want to know what kind of business this is, what the products and services are, who the customer is, and what the realistic (instead of overall) market opportunity is . . . what kind of business this is, what the products and services are, who the customer is, and what the realistic market opportunity is. I also want to know why the founders are uniquely qualified to build this business." Another judge commented that "the plan should convince the reader that it actually can be executed. This involves a convincing story of how the product will actually accomplish its purpose—will it actually work?—and how the proprietors of the plan intend to design, manufacture and market it. The plan should explain why the reader should believe that this team has or can obtain the experience and expertise necessary to make it happen. It should ruthlessly assess risk and outline how to deal with it."

Hypothesis 1: Entrepreneurial teams that are able to gather information in different areas relating to a business plan would perform better than entrepreneurial teams that gather information in fewer areas relating to preparing a business plan.

Experience of external contact and performance

In the above paragraphs, I argued that the teams preparing a business plan should gather a wide range of information, because such preparation requires the development of different

functional areas such as marketing, finance and product development. Related to the need for task-relevant information, I expect that entrepreneurial teams who are able to get information from people with a broad perspective will perform better than entrepreneurial teams that get information from people with a more narrow perspective. The reason for this expectation is that a business plan is a holistic document that conceptualizes the whole business model (Olive, 1996). Although no study to my knowledge has tested this hypothesis, Stuart and Abetti (1990) provide indirect evidence that management experience can be a predictor of entrepreneurial performance. In addition, Bygrave and Timmons (1992) argue that advice from venture capitalists—who are able to provide this broad perspective—improves the chances of venture success. Similarly, Schilit (1996) argues that venture capitalists strengthen a new venture by providing a broad perspective and help in strategy development.

The interviews also suggest that having people with a broad perspective—such as venture capitalists or those with founding experience—can improve entrepreneurial team performance because it helps the entrepreneurial team focus on critical issues. For example, one team member (INT 12) said, "The major weakness for a start-up to get started is to get a client. This [knowledge] is from our discussions with Jim . . . [who has start up experience. He told us] . . . that if you have a client it makes it easier to get additional clients; working with the first client yourself is very good. You learn a lot and you get feedback which helps you." Another team member said that "One of the great contributors was my father [who had] . . . started a business in Silicon Valley. He helped us set a direction for the business, what kinds of markets were out there, how to address the markets, how to develop a business plan." Another team member who did not get advice from people with start-up experience regretted that decision and said (INT 11),

"I think that it would be a very good idea [to have a mentor]. . . We [will] get one of those the next time. I think they have experience in the whole thing—like all the things in our team that we did badly, they would tell us ahead of time and we would realize that and we would change."

Hypothesis 2: Entrepreneurial teams that are able to get information from people with a broad perspective—such as venture capitalists, CEOs or people with founding experience—will perform better than entrepreneurial teams with external contacts having a narrower perspective.

Efficiency of information gathering and performance

Although I argued that entrepreneurial teams should gather a wide range of information and gather it from the right people, information gathering can be costly, since time and effort must be expended in the process. Unfortunately, entrepreneurial teams are resource-constrained (Casson, 1982), and often for several reasons. First, entrepreneurial teams tend to be small. Empirical studies suggest that the average entrepreneurial team has four or fewer members (e.g., Roberts, 1991a; Vyakarnam, Jacobs and Handelberg, 1997). In this study, average team size is also small, with a mean and median of four and a range of two to 10. Second, as illustrated by Roberts (1991a), many of the founders first "moonlight" during the early start-up phase and continue to hold a full-time job. In this sample, over 90 percent of the participants are either holding a full-time job or are full-time students.

I argue that, with limited resources at their disposal, entrepreneurial teams that are able to gather information efficiently should have higher performance than teams that are less efficient

in gathering information. This assertion is supported by the social capital literature (e.g. Burt, 1992). Burt (1992) argues that an efficient network that bridges different networks bring about more information for the same number of contacts and presents opportunities for entrepreneurial behavior (Burt, 1997). More specifically, Granovetter (1973) found that most people got information that led to jobs from weak rather than strong ties. He defines weak ties as the combination of time spent with (the lesser the time, the weaker the tie strength), emotional intensity (the less emotional intensity, the weaker the tie strength) and level of intimacy (the lower the level of intimacy, the weaker the tie strength) with external contacts.

According to Granovetter (1995:41), strong ties are in general not the most efficient types of job contact (Granovetter, 1995: 48). He (Granovetter, 1995: 53) explains that those to whom one is closest to tend to move in similar social circles. Consequently, the information that strong ties are able to provide tends to be the same as that which one already has. On the other hand, weak ties serve as connections for people to reach sources of information that are otherwise not directly accessible (Granovetter, 1973). In his study, he measured the strength of tie as the amount of time spent together by two persons (Granovetter, 1995: 53). These fell into the three categories, of "often"—at least twice a week; "occasionally"—more than once a year but less than twice a week; and "rarely"—once a year or less. In another study, Lin, Ensel and Vaugh (1981) also found that weak ties are more beneficial than strong ties in the job search process. They followed Granovetter's (1973) argument that tie strength can be determined by the nature of relationships, measured by categories such as relatives, friends, neighbors and acquaintances. The benefits of weak ties have also been mathematically demonstrated in a model developed by Montgomery (1992).

Following Granovetter (1973), who empirically found the benefits of weak ties, I hypothesize that entrepreneurial teams that are more efficient in information gathering—as evidenced by having weak ties—would perform better than entrepreneurial teams that make use of strong ties. Following the arguments of Granovetter (1973) and the empirical support by Granovetter (1973) and Lin et al. (1981), I will use both the frequency of interactions and the nature of relationships to determine strength of a tie between team members and external contacts.

Although the interviewees did not specifically mention the benefits of weak ties over strong ties, several highlighted the benefits of new ties that they made during the course of the competition. One team member (INT 5) illustrated that "the judges helped a lot. [My team member] called both the judges who wrote our evaluations and had long discussions with both of them, to try and find out what were the problems with our business plan and where we should go [from here and] they were really helpful." Another team member (INT 13) illustrated that a new contact "told us exactly how the process currently works, where all the bottlenecks are, and where we can fit our products so we can speed up that insurance process and make sure that doctors are correctly doing billing applications."

Hypothesis 3a: Entrepreneurial teams with members having weak ties, as determined by the nature of relationships, will perform better than entrepreneurial teams with members having strong ties.

Hypothesis 3b: Entrepreneurial teams with members having weak ties, as determined by the frequency of interactions, will perform better than entrepreneurial teams with members having strong ties.

RESEARCH METHOD

Sample and procedure

The sample comprised the 73 teams who participated in the MIT $50K Competition in 1998. Of the team members, 257 out of 310, or 83 percent, returned the questionnaire. No statistical differences was found between the respondents and non-respondents in the dimensions of age, sex, and team size, suggesting that the sample was representative of all the participants in the MIT $50K Competition for that year.

Independent variables

Respondents were given a table where they were asked to list all the people that were important to their teams. They were asked to rate the position of the person, the type and extent of interaction, and the prior relationship. The questions were adapted from Burton (1995), Granovetter (1973) and Lin et al. (1981).

Range of external contacts

Team members' responses to the question on the type and extent of interaction were used to determine the range of external contacts. I coded the type of information they received from these contacts into 10 categories, closely following that of the layout of a business plan. The 10 categories, together with sample descriptions given by the questionnaire respondents were: (1) business idea, e.g., "meet twice a week to discuss business plan and he helped with research for plan", (2) business strategy, e.g., "suggesting strategy, business direction", (3) product, e.g., "discuss design of active noise reduction adapter to telephone", (4) technology, e.g., "discuss methods of active noise reduction via email and telephone conversations", (5) general, e.g., "gave advice on whether the project was ok", (6) start-up advice, e.g., "advised on starting up a company", (7) network, e.g., "has assisted in arranging meetings with interested parties", (8) financing, e.g., "helped financial arrangement", (9) legal, e.g., "helped with patent issues and incorporations", and (10) market and industry, e.g., "industry resource interview". The total numbers of teams in this study with contacts in each category were 19, 11, 5, 26, 29, 5, 5, 8, 9, and 24 respectively. Since I did the coding alone, no reliability statistics are available. However, the answers were short, about a phrase or sentence long and unambiguous. To minimize rater bias, the coding was done without knowing either the names of the teams or the names of the respondents. The range of external contact was calculated by the number of categories out of the five major categories[1] (defined as more than 10 teams gathering information in these areas) that

[1] Using all 10 categories to determine the range of information gathered produced similar results as that using the five major categories. The five-category coding system was adopted because it better represented the actions of the teams in this study.

the team gathered from external contacts For example, a team that received advice on how to market the product and to solve a technical issue regarding that product received a score of 0.4.

Experience of external contact

Participants were asked to describe the title or job position of the external contacts that they had dealings with. I assumed that the type of perspective that the contact had depended on the job level of that contact. Contacts with jobs with titles such as President of Kitty Research Associates, Chairman of the MIT Corporation or Lotus founder were coded as contacts with broad perspective and were each given a score of 3. Contacts with more specialized jobs were each given a score of 2. This included contacts with titles such as Banker in BankBoston, Professor at Sloan, attorney or vice-president of Marketing. Contacts without any specific experience relating to starting a business, were each given a score of 1 (e.g., classmates). In total, 37, 130 and 50 were in levels 1, 2 and 3 respectively. I used the highest experience level to represent the extent a team used contacts with broad perspective[2].

Frequency of interaction with external contacts

I coded the frequency of interaction with external contacts from the respondents' answer to the type and extent of interaction with people outside the team. These interactions were coded as 1 = one meeting or two meetings, 2 = few meetings (approximately three to five meetings)

and 3 = regular meetings. For example, one respondent answered in the questionnaire that he "met [the contact] once to discuss scope of project and solicit suggestions" and another "I called her once to check method to do financial projections." These respondents were each given a score of 1. Respondents who answered "talked regularly about pharmaceutical trends/opportunities" or "meet twice a week to discuss business plan" were each given a score of 3. In less frequent instances, respondents said that they interacted with the respondents a few times. A respondent answered "one meeting at his office, 3-4 email and phone calls, did market research" and another answered "a few phone calls"; they were each given a score of 2. 143 interactions with external contacts were coded as 1, 13 as 2 and 36 as 3. This coding system was adapted from Granovetter (1973) who developed three categories of often"—at least twice a week, "occasionally"—more than once a year but less than twice a week; and "rarely"—once a year or less. One problem of this coding system was that the scales did not correspond to the actual frequencies (and in addition, different points in the scale are not linearly related). However, the advantage was that the participants were free to describe the type of interactions that mattered to their teams. I used the maximum frequency level as a proxy of the extent utilized strong ties[3].

Relationship with external contacts

[2]Using the three experience levels as categorical variables produced similar results.

[3] It is likely that entrepreneurial team performance will be influenced by the interaction of experience level of contact and frequency of interaction. However, in this study, it was not possible to model this interaction effect because of the high correlation (above .9) between the main and interaction variables.

Respondents were asked in the questionnaires to describe their relationships with external contacts. These were coded as follows: 1= no ties, 2 = weak ties and 3 = strong ties. For example, a respondent who answered in the questionnaire "met through his talks" and another who answered "introduced by a friend" were each given a score of 1. A respondent who answered "vendor that I dealt with at work" and another who answered "person is a friend of mine" were each given a score of 2. A respondents who answered "father of team member" and another who answered "friend of 20 plus years" were each given a score of 3. This coding system was adapted from Granovetter (1995:41) who described ties as "family-social"—relatives, friend of the family—or "work contact"—a person known in a work situation. Granovetter (1995:41) found that although these categories were logically not mutually exclusive, in 90 percent of the cases they were. Similarly, Lin et al. (1981) operationalized strength of ties into relationships such as relatives, friends, neighbors and acquaintances. In this study, 73 external contacts were given scores of 1, 107 scores of 2 and 32 scores of 3. The answers were short, about a phrase long. Following the frequency of interaction with external contacts variable, the maximum level was used as a proxy of the extent that teams engaged in inefficient information gathering (i.e. using strong ties).

Control Variables

As shown in chapter 4, both team size and industry should be controlled. Entrepreneurial teams tended to be small (e.g., Roberts, 1991a) and within the range of size in entrepreneurial teams, larger teams are more likely to have more information resulting in higher performance

levels (e.g., West and Anderson, 1996). Industry was controlled because investors preferred some industries for early financing (Haar, Starr and MacMillan, 1988).

RESULTS

Table 6.1 shows the bivariate correlations, means and standard deviations of the variables in this study. Most of the teams were rated by the judges as slightly above average in performance with a mean judge score of 2.95, s.d.=0.55 (on a scale of 1 to 5). The members were also positive about their teams' performance, with a mean member-rating of 4.93, s.d. 0.66 (on a scale of 1 to 7). The average team size was small, with 4.05 members and a standard deviation of 1.8. About 77 percent of the teams in this competition did a plan that related to a technology area—such as computer hardware and software. The average highest level person that a team contacted was 2.48 (s.d. 0.57)—somewhere between a specialist and a person with founding experience. The average range of areas consulted with external contacts was 0.29 (s.d. 0.25)—implying that external contacts were consulted in one or two areas. None of the correlations were above 0.60 where multicolinearity problems might be present (Kennedy, 1992).

INSERT TABLE 6.1 HERE

The effects of external contacts on entrepreneurial team performance were expected to depend on a series of factors, including the type of information collected, who the information was collected from and the efficiency of information collection. To collectively explore the

effects of these factors on team performance, I presented a series of 12 regressions. Models 1 to 6, shown in Table 6.2, explored the effects of external contacts on judges' performance ratings. Model 1 included only the control variables of size and industry. Models 2 to 5 included the control variables and each of the external contact variables. They were the range of information gathered, experience level, interaction frequency and relationship with contact respectively. Model 6 included the control variables together with all the external contact measures. Models 7 to 12, shown in Table 6.3, were similar to Models 1 to 6 respectively except that the dependent variable was member-ratings of team performance.

INSERT TABLE 6.2 HERE

Model 1 with an R^2 of 0.20 ($F=8.72$, $p<0.01$) showed that the control variables of size and industry predicted judges' ratings. Size positively predicted external evaluations ($b=0.06$, $t=1.88$, $p<0.10$). Given the small average size of teams in this study, larger teams were expected to perform better than smaller teams. This was because entrepreneurial teams that were relatively larger had access to greater resources, without the corresponding process loss of large teams (West and Anderson, 1996). As explained in earlier chapters, one possible reason that entrepreneurial teams in technology-related plans were evaluated less favorably by the judges ($b=-0.52$, $t=-3.76$, $p<0.01$) was that some of these teams focused on the technology and not on building a business.

Model 2 included the control variables and range of information gathered on judges' ratings. The R^2 remained at 0.22 ($F=6.50$, $p<0.01$) and the change in R^2 from the baseline model,

i.e., comprising the control variables, was not statistically significant at $p<0.10$. Range of information gathered did not predict judges' ratings ($b=0.33$, $t=1.36$, n.s.). Model 3 included the control variables and experience level. Again the R^2 was 0.20 ($F=4.38$, $p<0.01$) and the coefficient of experience level ($b=0.17$, $t=1.40$) was not statistically significant at $p<0.10$. Model 4 included the control variable and interaction frequency. The model showed that the interaction frequency variable was not statistically significant at the $p<0.10$ level ($b=-0.06$, $t=-0.84$, n.s.). Model 5 included the control variables and relationship with contact. As predicted, stronger relationships ($b=-0.20$, $t=-1.87$, $p<0.10$) predicted lower judges' ratings.

Model 6 included the control and predictor variables. The model's R^2 increased to 0.33 ($F=3.79$, $p<0.01$) from the baseline of 0.20, a statistically significant difference at $p<0.01$. Although the coefficients showed that engaging external contacts that can provide a broad perspective positively predicted performance ($b=0.14$, $t=1.16$), the result was not statistically significant. The benefit of engaging weak ties was partially supported; relationship with contact negatively predicted judges' ratings ($b=-0.27$, $t=-2.62$, $p<0.01$). However, no support for interaction frequency ($b=-0.09$, $t=-1.23$, n.s.) and range of information gathered ($b=0.46$, $t=1.40$, n.s.) on judges' ratings were found. The findings are discussed in the next section.

INSERT TABLE 6.3 HERE

The next set of Models 7 to 12, regressed the effects of the independent variables on member-ratings. Model 7 included only the control variables of industry and team size and neither coefficients of size ($b=-0.04$, $t=-0.97$) and industry ($b=-0.15$, $t=-0.82$) were statistical

significant at $p<0.10$. The R^2 of the model was also low with ($R^2=0.02$, $F=0.82$, n.s.). Model 8 included the control variables and range of information gathered. The Model R^2 remained low ($R^2=0.11$, $F=2.88$, $p<0.05$) but the coefficient of range of information gathered ($b=0.80$, $t=2.62$) was statistically significant at $p<0.05$ level. Models 9, 10, 11 included the control variables and experience level, interaction frequency and relationship with contact respectively. All three predictor variables of experience level ($b=0.19$, $t=1.25$), interaction frequency ($b=0.05$, $t=0.51$) and relationship with contact ($b=0.12$, $t=0.90$) were not statistically significant. Model 12 included the control variables and all the predictor variables. The overall Model's R^2 was 0.17 ($F=1.64$, n.s.). The only variable that was statistically significant was range of information gathered ($b=0.91$, $t=2.17$, $p<0.05$). Reasons for these findings are discussed in the next section.

DISCUSSION AND CONCLUSION

The study looked at how team member interactions with people outside the team can influence short-term entrepreneurial team performance. An external perspective is important for entrepreneurial activities because social contacts provide information that would otherwise be unavailable to the entrepreneur (e.g., Burt, 1997). The study explores different ways in which external contacts could influence performance. First, I explored the effects of having access to a range of information, expecting a wider range of information to result in higher entrepreneurial team performance. Since preparation of a business plan requires the conceptualization of the whole business model (Olive, 1996), I expected that teams with contacts having a broad perspective would have higher team performance. However, as entrepreneurial teams have

limited resources (e.g., Casson, 1982), I also expected that those capable of gathering information efficiently (using weak ties who can introduce new information) would have higher performance.

Overall, there is only limited support that the way entrepreneurial teams engage external contacts influences performance. For external evaluations of entrepreneurial team performance, there is no support for Hypothesis 1 that entrepreneurial teams that gather a wide range of information from external contacts perform better than those that gather a narrow range of information. In addition, no support is found for Hypothesis 2 that entrepreneurial teams should engage external contacts with a broad perspective. One possible reason for these findings is that it is only beneficial to engage external ties to get information that members cannot gather internally, suggesting that internal factors should be considered in conjunction with external factors. This assertion is supported by the research of Ancona and Caldwell (1992a) who studied external factors together with internal task processes. However, in this paper, internal factors are not included in the models and this limitation is addressed in the concluding chapter. There is support, however, for Hypothesis 3 that entrepreneurial teams that use weak ties (e.g., acquaintances or infrequent contacts) would perform better than teams that use strong ties. The finding that too strong external ties are detrimental to entrepreneurial team performance is consistent with Ancona and Caldwell's (1992b) finding that excessive environmental scanning hurt team performance. This study, together with other studies (e.g., Ancona and Caldwell, 1992b) suggest that entrepreneurial teams must network with external ties, but should do so efficiently.

In member evaluations of team performance, the results show that teams who get a wide range of information from external contacts evaluate their teams more favorably. Therefore, Hypothesis 1, on the benefits of getting a range of information, is supported. However, there is no supportive evidence of Hypothesis 2 that contacts with broader experience can contribute more to the entrepreneurial team than contacts with a narrower perspective. In addition, Hypotheses 3 on the benefits of weak ties, are not supported. These findings suggest that the "naïve" theory is one postulating that diversity of information from external contacts is beneficial for team performance, with less regard for how the information is gathered.

To review, this study extends the small yet growing body of entrepreneurial team literature. It is only recently that greater attention has been placed on the whole team and not on the lone entrepreneur (e.g., Cooper and Daily, 1996; Vyakarnam et al., 1997). This study adds to earlier research and makes the following contributions. First, it shows how engaging in external contacts can affect performance but instead of studying the benefits of external contacts per se, the study explores the content of the interactions and the backgrounds of the people with whom the team members interact. Together with previous studies (e.g., Ancona and Caldwell, 1992a; and Nahapiet & Ghoshal, 1998) that have shown that external contacts can have performance effects, this study leads to a comprehensive understanding of precisely how external contacts influence team performance.

Second, this study shows that social capital network concepts, such as strong and weak ties, are applicable to the team level of analysis. Most social capital studies have focused either at the individual (e.g., Granovetter, 1973) or at the organizational (e.g., Soh and Roberts, 1998) level. However, researchers have for the most part, neglected social capital concepts at the team

level. At the same time, the studies on team external relationships (e.g., Ancona and Caldwell, 1992) have mostly ignored the social capital research. This study represents a step towards integrating these two sets of literature. For example, I show that strength of tie is one network area that could be integrated into the team literature. Other network concepts that could be integrated include structural holes (the extent that nodes in the network are able to bridge different networks), centrality (position of node in the network) and density (proportion of nodes in the network with which a node has contacts). These network factors influence the uniqueness and the quality of information that a team is able to gather, and also affect thoroughness of information gathering. In turn, these elements influence the performance of entrepreneurial teams. This study also emphasizes the different internal and external evaluations of team performance.

Focusing on how teams at the early start-up phase can engage external contacts to improve entrepreneurial team performance, this study finds that entrepreneurial teams that receive favorable external evaluations should gather information efficiently. One limitation of the study is that the types of information acquired by team members are self-reported. Future research can use laboratory methods to manipulate the range and types of information available to the teams to increase the confidence of the results. Future studies can also explore the types of external contacts that are needed at later stages of a venture's development. For example, Roberts (1991) notes that many entrepreneurs get their funds from friends and family (e.g., Roberts, 1991). Thus, during the stage when the venture requires funds to implement its plans or expand its scope of operations strong ties may be preferable to weak ties. Uzzi (1996) also notes that suppliers who have close links to a firm may be more willing than other suppliers to invest

in specialized equipment to service that firm. In this instance, strong ties may be better than weak ties. Future studies can also explore how different network concepts—such as structural holes, centrality and density—influences entrepreneurial team performance.

Table 6.1. Descriptive Statistics and Bivariate Correlations for the Dependent and Independent Variables

	Mean	SD	1	2	3	4	5	6	7	8
1 Judges' Ratings of Performance (JudRate)	2.95	0.55	1.00							
2 Member-Ratings of Performance (MemRate)	4.93	0.66	0.24	1.00						
3 Size (Size)	4.05	1.80	0.19	-0.12	1.00					
4 Industry (Industry)	0.77	0.43	-0.40	-0.10	0.02	1.00				
5 Range of External Contacts (Range)	0.29	0.25	0.22	0.26	0.25	-0.07	1.00			
6 Experience Level of External Contacts (Level)	2.48	0.57	0.19	0.15	0.12	-0.02	0.30	1.00		
7 Frequency of Contact (Freq)	1.79	0.91	-0.10	0.05	0.06	0.01	0.20	0.03	1.00	
8 Relationship with Contact (Relation)	2.23	0.66	-0.23	0.12	0.02	0.00	0.19	0.07	0.04	1.00

* Correlations of .23 and above are significant at the 0.05 level (2-tailed).

** Correlations of .40 and above are significant at the 0.01 level (2-tailed).

Table 6.2. Regressions Predicting the Effects of Team External Contacts on Judges' Ratings of Entrepreneurial Team Performance

Variables	Model 1			Model 2			Model 3		
	B	(S.E.)	t	B	(S.E.)	t	B	(S.E.)	t
Constant	3.10	0.18 **	17.33	3.12	0.18 **	16.66	2.78	0.35 **	8.06
Size	0.06	0.03 †	1.88	0.05	0.03	1.49	0.04	0.04	0.98
Industry	-0.52	0.14 **	-3.76	-0.51	0.14 **	-3.67	-0.49	0.16 **	-3.16
Range				0.33	0.24	1.36			
Level							0.17	0.12	1.40
Freq									
Relation									
R^2		0.20			0.22			0.20	
F-stats		8.72 **			6.50 **			4.38 **	

**=p<.01, *=p<.05, †=p<.10

Table 6.2 cont. Regressions Predicting the Effects of Team External Contacts on Judges' Ratings of Entrepreneurial Team Performance

Variables	Model 4			Model 5			Model 6		
	B	(S.E.)	t	B	(S.E.)	t	B	(S.E.)	t
Constant	3.37	0.25 **	13.47	3.05	0.31 **	11.55	3.55	0.42 **	8.44
Size	0.04	0.04	0.94	0.04	0.04	1.11	0.02	0.04	0.54
Industry	-0.54	0.16 **	-3.32	-0.47	0.16 **	-2.93	-0.52	0.16 **	-3.21
Range							0.46	0.33	1.40
Level							0.14	0.12	1.15
Freq	-0.06	0.08	-0.84				-0.09	0.07	-1.23
Relation				-0.20	0.10 †	-1.87	-0.27	0.10 **	-2.62
R^2		0.19			0.20			0.33	
F-stats		4.14 **			4.28 **			3.79 **	

**=p<.01, *=p<.05, †=p<.10

Table 6.3. Regressions Predicting the Effects of Team External Contacts on Member-Ratings of Entrepreneurial Team Performance

Variables	Model 7			Model 8			Model 9		
	B	(S.E.)	t	B	(S.E.)	t	B	(S.E.)	t
Constant	5.22	0.24 **	22.10	5.08	0.23 **	21.78	4.80	0.45 **	10.77
Size	-0.04	0.04	-0.97	-0.07	0.04	-1.64	-0.06	0.05	-1.28
Industry	-0.15	0.18	-0.82	-0.12	0.18	-0.67	-0.11	0.20	-0.53
Range				0.80	0.31 **	2.62			
Level							0.19	0.15	1.25
Freq									
Relation									
R^2		0.02			0.11			0.06	
F-stats		0.82 n.s.			2.88 *			1.09 n.s.	

**=p<.01, *=p<.05, †=p<.10

Table 6.3 cont. Regressions Predicting the Effects of Team External Contacts on Member-Ratings of Entrepreneurial Team Performance

Variables	Model 10			Model 11			Model 12		
	B	(S.E.)	t	B	(S.E.)	t	B	(S.E.)	t
Constant	5.39	0.30 **	17.98	4.95	0.41 **	12.10	5.01	0.53 **	9.51
Size	-0.08	0.05 †	-1.80	-0.05	0.05	-0.99	-0.09	0.05 †	-1.83
Industry	-0.18	0.20	-0.93	-0.10	0.21	-0.47	-0.13	0.20	-0.64
Range							0.91	0.42 *	2.17
Level							0.01	0.16	0.07
Freq	0.05	0.09	0.51				0.01	0.09	0.14
Relation				0.12	0.14	0.90	0.01	0.13	0.09
R^2		0.08			0.04			0.17	
F-stats		1.46 n.s.			0.68 n.s.			1.64 n.s.	

**=p<.01, *=p<.05, †=p<.10

CHAPTER 7

CONCLUSION

This thesis is about how short-term entrepreneurial teams can be designed to be high performing. Using the findings in the last three chapters, this chapter develops a preliminary model of new venture team performance. As shown in Figure 7.1, performance is predicted to be influenced by internal and external factors, with diversity (both functional and non-functional) as antecedents of team activities. This model is tested in this chapter and the results are used to develop a revised model. Given the small sample size, and the small number of control variables, the models should be interpreted as preliminary that should be tested in future studies. The chapter also compares the findings in the thesis to the team and new venture literatures, concluding with the study's limitations that point to areas for future research.

INSERT FIGURE 7.1 HERE

PRELIMINARY MODEL OF FACTORS INFLUENCING ENTREPRENEURIAL TEAM PERFORMANCE

As highlighted in Figure 7.1, the effects of non-functional diversity on team activities were not explored in previous chapters. The previous papers focused on functional diversity because some studies on work teams (e.g., Bantel and Jackson, 1989) found that while functional

diversity influenced performance, non-functional diversity did not. In addition, several researchers (e.g., Tsui et al., 1989 and Ancona and Caldwell, 1992a) argue that it is the task and skill related differences in a team that affect performance. This chapter included non-functional diversity to have a more complete understanding of how high-performing entrepreneurial teams should be designed. Furthermore, some recent studies on work teams (e.g., Barsade, et al., 1998) found that some types of non-functional diversity, such as affective differences among team members, have performance effects.

The remaining parts of this section summarize the literature and findings from previous chapters that support this model first showing how diversity influences team internal and external team activities, followed by an explanation of how these activities influence performance.

In the model, functional diversity is an antecedent of team holding, with team holding defined by Louis and Yan (1996) to include perceptions by team members of who is and is not a member of the team, how closely they work as a team and their level of team identity. Following the results in paper 2, Figure 7.1 predicts that teams with greater functional diversity will have lower levels of team holding than teams with less functional diversity. A reason for the prediction is that similarity increases cohesion (e.g., O'Reilly et al., 1989) and psychology attachment (e.g., Tsui et al., 1992) while lowering identity differences (e.g., Thomas-Hunt and Gruenfeld, 1998) and decreasing turnover (e.g., Pfeffer and O'Reilly, 1987). The model also predicts that the effects of non-functional diversity on team holding is the same as that of functional diversity because all types of diversity lead to lower cohesion (e.g., O'Reilly et al., 1989) and psychology attachment (e.g., Tsui et al., 1992).

Hypothesis 1: Functionally diverse entrepreneurial teams have lower levels of team holding than less diverse teams.

Hypothesis 2: Non-functionally diverse entrepreneurial teams have lower levels of team holding than less diverse teams.

In addition to the effects of diversity on internal factors, diversity could also influence the range of information available to the team. Diversity of team membership, both functional and non-functional, should be associated with a wider range of information that the team members collect from external contacts because members with different backgrounds tend to move in different social circles. People in different social circles in turn are expected to contribute different types of information (Burt, 1992). The findings of Ancona and Caldwell (1992a) (and summarized by Ancona and Caldwell, 1998) provide indirect support for this assertion. They found that as compared to homogeneous teams, heterogeneous teams have higher connectedness (i.e., are more involved) with the external environment.

Hypothesis 3: Functionally diverse entrepreneurial teams are expected to gather a wider range of information from external contacts than less diverse entrepreneurial teams.

Hypothesis 4: Non-functionally diverse entrepreneurial teams are expected to gather a wider range of information from external contacts than less diverse entrepreneurial teams.

The effects of internal factors on entrepreneurial team performance, namely team holding and task division, had been explored in papers 1 and 2 and the results are summarized here. Paper 2 found that team holding positively predicted member performance ratings. A possible reason that team holding could lead to positive member-ratings is that team members use perceptions of how they worked together to evaluate performance, equating better processes to better performance even if these perceptions are not accurate (Campion et al., 1996). I do not hypothesize the effects of team holding on externally-rated performance because paper 2 found that this factor did not predict external performance ratings.

Hypothesis 5a: Higher levels of team holding will be associated with higher levels of member-rated team performance.

Paper 1 found that entrepreneurial teams that divided tasks with members as generalists performed better than teams that had members specialize in different tasks. A reason for the finding is that in innovative activities, where tasks are non-routine and knowledge is incomplete, task generalization is preferred (Alder and Borys, 1996; Spender, 1995) because it enables team members to have a better understanding of the issues faced by the whole team (Van de Ven, 1986).

Hypothesis 5b: Entrepreneurial teams in which tasks are divided so that members are specialists perform worse than entrepreneurial teams in which tasks are assigned to members who are generalists.

The final set of hypotheses explores the effects of team external contacts on entrepreneurial team performance. The previous chapter studied the effects of the backgrounds of external contacts, the types of information and how the information was collected on performance. The results showed that external contacts had limited effects on externally-rated performance with only efficiency of information collection influencing performance. This limited support for external activities on performance is surprising because several researchers (e.g., Ancona and Caldwell, 1992a) have shown that external activities influence team performance and as argued by Ancona and Caldwell (1998), in some instances, external activities are better predictors of team peformance than a team's internal characteristics. One possible reason is that external interactions should be studied in conjunction with a team's internal characteristics, suggesting that both internal and external factors must be managed simultaneously. This assertion is indirectly supported by Ancona and Caldwell's (1992a) research: they found external effects on performance but their models included internal task processes.

Following paper 3, the model in Figure 7.1 predicts that the type of information a team collects from external contacts, the type of perspective (broad or narrow) that these contacts bring to the team and the efficiency of information collection influence performance. Getting a wider range of information is expected to be beneficial for entrepreneurial team performance

because having and combining different types of information can lead to the discovery of entrepreneurial opportunities (Nahapiet and Ghosal, 1998; Kirzner, 1997). Getting information from contacts that provide a broad perspective (e.g., founders or CEOs) is beneficial because advice from these contacts can strengthen a venture by helping the team in strategy development (Schilit, 1996) and increasing the venture's chances of success (Bygrave and Timmons, 1992). Finally, because entrepreneurial teams are resource-constrained (Casson, 1982), teams that are efficient in information gathering should perform better than teams that are less efficient in information gathering. The social capital literature (e.g., Granovetter, 1973) shows that gathering information from weak ties is more efficient because those to whom one is closet to tend to move in similar social circles and the information strong ties provide tends to be the same as that which one already has. Granovetter (1973) explains that the strength of tie can be determined by the frequency of interaction (greater frequency predicts stronger ties) and type of relationship (e.g., acquaintances are weak ties while family members are strong ties).

Hypothesis 6a: Entrepreneurial teams that are able to gather information in different areas relating to a business plan would perform better than entrepreneurial teams that gather information in fewer areas relating to preparing a business plan.

Hypothesis 6b: Entrepreneurial teams that are able to get information from people with a broad perspective—such as venture capitalists, CEOs or people with founding experience—will perform better than entrepreneurial teams with external contacts having a narrower perspective.

Hypothesis 6c: Entrepreneurial teams with members having weak ties, as determined by the nature of relationships, will perform better than entrepreneurial teams with members having strong ties.

Hypothesis 6d: Entrepreneurial teams with members having weak ties, as determined by the frequency of interactions, will perform better than entrepreneurial teams with members having strong ties.

Research Method and Results

The methods used to measure the variables in Figure 7.1, with the exception of non-functional diversity, had been described in previous chapters. This section only describes how functional diversity was measured, followed by a description of the results.

Diversity of organization affiliation, as defined by the proportion of non-MIT members in the team[1], was used as a proxy of non-functional diversity. This measure was used since anecdotal evidence (e.g., Roberts, 1991a) suggested that many companies, such as DEC, were formed by team members who belonged to the same organization. Powell and Foley (1998) in a the literature review also found that people were likely to form groups with people—such as

[1] Eighty percent of the participants, including at least one member in each team, were full-time MIT students. One limitation of using the extent of MIT affiliation to measure diversity of organization affiliation is that in some cases all the non-MIT team members came from one other organization (e.g., Harvard Business School) while in other instances, they came from different organizations. Unfortunately, in some instances, the affiliations of the non-MIT team members were not known and given the exploratory nature of this thesis, I decided to use this simple classification as the proxy for diversity of organizational affiliation. Future studies should use a more fine-grained measure to determine the affiliations of all members in the team.

colleagues—that were proximal to them. The model explores whether the tendency to select members among people with common organizational affiliation has performance effects.

Twelve models were used to test Figure 7.1, with the results used to develop a revised preliminary model of the factors influencing entrepreneurial team performance. Models 1 to 8 explored the direct effects of all the predictor variables, i.e., internal, external and diversity, on judges' and member-ratings of performance. Model 1 regressed the control variables of size, industry and managerial level diversity on judges' performance ratings. Model 2 added the internal factors to model 1 while model 3 added the external factors to model 2. Model 4 regressed the effects of all the variables on judges' ratings. Models 5 to 8 were similar to that of 1 to 4 except that the independent variable was member-ratings of entrepreneurial team performance. The next set of models 9 to 12 explored the effects of diversity, both functional and nonfunctional (represented by extent of non-MIT affiliation) on team holding and range of information from external contacts. The descriptive statistics, correlation coefficients together with the models are attached in Tables 7.1 to 7.5. To be consistent with previous papers, team size, industry and extent of managerial level diversity were controlled.

INSERT TABLES 7.1 AND 7.2 HERE

Model 1 ($F=2.56$, $p<0.05$, $R^2=0.15$) showed that Industry (beta=-0.37, t=-2.56, $p<0.01$) negatively predicted judges' ratings. The other variables of size (beta=0.17, t=1.18, n.s.) and company level diversity (beta=-0.14, t=-0.99, n.s.) were not statistically significant. Model 2 ($R^2=0.36$, t=4.54, $p<0.01$) added the internal variables of level of specialization and team

holding. Both team holding (beta=-0.09, t=-2.06, p<0.05) and specialization (beta=-0.34, t=-2.70, p<0.01) negatively predicted judges' rated performance. Reasons for these findings are discussed in the next section.

Model 3 (R^2=0.57, F=5.45, t<0.01) added external variables to Model 2. While previous papers focused on external and internal factors separately, this model factored in both sets of variables. As in Model 2, team holding (beta=-0.33, t=2.75, p<0.01) and specialization (beta=-0.23, t=2.04, p<0.05) negatively predicted performance. There was partial support for the benefits of engaging contacts that can provide a broad perspective (beta of experience level of contact =0.23, t=1.87, p<0.10). The benefits of engaging weak ties was also partially supported with frequency (beta=-0.23, t=1.98, p<0.10) negatively predicting performance.

Model 4 (R^2=0.57, F=4.85, p<0.01) added the functional diversity and extent of non-MIT affiliation variables. The model showed that these antecedents to internal and external activities did not directly predict performance. The results were mostly similar to Model 3 with two exceptions. First, the strength of tie was statistically significant (beta=-0.42, t=-3.67, p<0.01) while experience level of contact was not (beta=0.10, t=0.82, n.s.). However, the experience level variable was in the direction predicted. Overall, Models 1 to 4 showed that both internal and external factors influenced judges' ratings of performance while functional diversity and non-functional diversity did not directly predict judges' ratings.

INSERT TABLES 7.3 HERE

Models 5 to 8 explored the factors that influenced member-ratings of performance. Model 5 (R^2=0.10, F=1.56, n.s.) included the control variables of size (beta=-0.14, t=-0.93, n.s.), industry (beta=-0.16, t=-1.05, n.s.) and managerial level diversity (beta=-0.25, t=-1.67, n.s.). All the control variables were not statistically significant. Model 6 included both the internal factors of team holding (beta=0.23, t=1.54, n.s.) and level of specialization (beta=-0.22, t=1.57, n.s.). Both variables were not statistically significant at the $p<0.10$ level. Model 7 (R^2=0.32) included the internal and external factors. The F statistics of 1.92 ($p<0.10$) provided partial support that external and internal factors together predicted member performance ratings with team holding (beta=0.26, t=1.68, $p<0.10$) and range of contacts (beta=0.08, t=0.53, $p<0.05$) positively predicting member-ratings of performance. Model 8 included the direct effects of functional diversity and extent of non-MIT affiliation on performance. As in Model 7, there was partial support that team holding (beta=0.27, t=1.62, $p<0.11$) and range of information gathered from external contacts (beta=0.36, t=2.28, $p<0.05$) positively predicted member-ratings of entrepreneurial team performance. Functional and non-functional diversity did not directly predict performance.

INSERT TABLES 7.4 AND 7.5 HERE

While the earlier models showed how the variables directed predicted performance, the remaining models explored the effects of functional and non-functional diversity on team activities. Model 9 presented the effects of functional diversity on range of information collected from external contacts. The results showed that functional diversity (beta=-0.09, t=-0.79, n.s.)

did not predict range of information collected. Model 10 (R^2=0.15, F=2.99, p<0.05) with a beta coefficient of -0.28 (t=-2.17, p<0.05) showed that functionally diverse teams had lower levels of team holding than less functionally diverse teams. This results of this model together with that of Model 8 (the direct effects of all the predictor variables on member-ratings) suggested that functional diversity had indirect negative effects on member-ratings but positive effects on judges' ratings through the mediating variable of team holding.

Model 11 (R^2 = 0.10, F=1.89 n.s.) showed that the extent of non-MIT affiliation did not predict range of information collected (beta=-0.03, t=-0.26, n.s.) while Model 12 (R^2=0.15, F=3.11, t=0.05) suggested that the variable negatively predicted team holding (beta=-0.27, t=-2.27, n.s.). As in the case of the functional diversity variable, this finding showed that teams with more non-MIT affiliation indirectly predicted lower member-ratings but higher judges' ratings through the mediating variable of team holding.

Discussion and Revised Preliminary Model

A summary of the results together with the beta coefficients is shown in Figure 7.2. This revised preliminary model presents an initial attempt to have a comprehensive understanding of the factors, both internal and external to the team, that influence entrepreneurial team performance.

The results are in the direction found in the earlier papers with three new findings. First, the model shows that the effects of non-functional diversity, as measured by the extent of non-MIT affiliation, have the same effects on entrepreneurial team performance as functional

diversity. As compared to teams with more homogeneous membership, more diverse teams have lower team holding, suggesting that the effect of diversity is to lower team holding. This result is consistent with Ancona and Caldwell's (1998) assertion that diversity leads to lower team boundedness. The second new finding is that all the external contact variables, with the exception of expertise level of contacts, predict external-ratings. This finding is contrasted to paper 3, where only the extent of past relationship (i.e., acquaintance as weak tie and family member as strong tie) predicted externally-rated performance. The main difference between the models in this study and that in paper 3 is that internal factors are included suggesting that external factors should be studied in conjunction with how a team manages internal processes. The third new finding is that team holding negatively predicts external performance ratings but positively predicts member-performance ratings. One explanation for the negative association between team holding and performance is that teams with higher holding (teams in this sample have high holding with a mean of 5.27 on a seven-point scale), as compared to teams with lower holding, could be less open to differing views (Janis, 1982) resulting in defective decision-making strategies. However, the literature (e.g., Campion et al., 1986) also suggests that members associate better internal processes to better performance, even if these perceptions are not accurate. While previous studies (e.g., Gladstein, 1984) have shown that there could be different member and external interpretations of performance, no study to my knowledge has shown opposite performance effects.

The other findings are consistent with the previous three papers providing some support for the robustness of the findings. To summarize the findings show that teams that divide tasks such that members are generalists perform better than teams that divide tasks with members as

specialists. This finding is expected because in innovative activities, where knowledge is incomplete, doing different tasks enable members to better understand team issues (Van de Ven, 1986). The findings also show that while range of contacts positively predicts both internal and external performance evaluations, efficiency of data gathering predicts member performance evaluations. These findings suggest that both internal and external factors have performance consequences.

For the control variables, industry negatively predicts performance, with a possible reason illustrated by a judge who commented that some teams in technology related areas focus on the technology instead of conceptualizing a whole business model. After including the internal and external factors, size does not predict performance. This finding is unexpected since within the range of team size (which tends to be small, e.g., Roberts, 1991a) in entrepreneurial teams, larger teams should have access to more resources, without the corresponding process losses of larger teams (West and Anderson, 1996). One possible reason that size does not matter is that the benefits of larger teams have been accounted for by the internal and external factors in this model. Finally, the control variable of diversity of managerial level negatively predicts external-ratings. This finding is unexpected because one benefit of diverse membership is that people of different backgrounds bring in different information (e.g., Burt, 1992) that in turn predict entrepreneurial performance (e.g., Kirzner, 1997). Further research can explore the reasons for this finding.

The remaining sections of this chapter conclude the dissertation by first comparing the results with the existing team and entrepreneurship literatures before presenting the limitations of the study that present opportunities for future research.

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COMPARING RESULTS WITH THE TEAM AND ENTREPRENEURSHIP LITERATURES

Comparing Results With the Team Literature

This study supports some findings in the team literature more than other findings. First, it shows that there are different drivers of internal and external performance ratings. While several researchers have shown differences between these ratings (e.g. Campion et al., 1996), this study clarifies that external-ratings are influenced by team task design and how team members engage external contacts while member-ratings are influenced by task processes. Although some researchers (e.g., Hackman, 1987) assert that it is design that influences performance while others (e.g., Senge, 1991) focus on internal factors, this study shows that both sets of researchers are partially correct because different factors have different performance effects.

The thesis also finds that while diversity is beneficial to externally-rated performance, it negatively predicts member-rated performance. This finding suggests that diversity needs to be properly managed so that the negative effects on member perceptions of team performance do not offset the benefits of diversity. Both sets of performance measures are important. While positive external evaluations can lead to more funding (e.g., Roberts, 1991b) and lower failure

rates (e.g., Shane and Foo, 1999), positive internal evaluations can increase member satisfaction and continued team involvement (Hackman, 1987).

The study also clarifies the mechanisms through which diversity, both functional and non-functional, affect entrepreneurial team performance. It shows that diversity influences performance indirectly (and not directly) through some internal factors such as team holding and not through the way member divide tasks. The finding that only some internal factors mediate the effects of diversity on performance support Lawrence's (1997) assertion that mediating effects must be studied in order to understand exactly how diversity influences performance. This study, together with an increasing number of studies that use a mediated approach (e.g. Barsade et al., 1998) can lead to a better understanding of diversity effects on performance.

The thesis supports previous studies that there are different dimensions of team identity (Hinkle et al., 1989) and conflict (e.g., Jehn, 1995). However, the study also finds that the sub-factors are highly correlated and subsequently have similar performance effects. Thus while some researchers (e.g., Jehn, 1995) argue that task conflict can be beneficial to team performance because it leads to a better understanding of team issues, promoting this conflict type could also lead to negative consequences through relationship conflicts. This thesis using the conflict scale developed by Jehn and associates (e.g., Jehn, et al., 1997) finds a two factor structure comprising task and relationship conflicts. This finding is in the same direction of many past studies of a two-factor conflict structure (e.g., Amason and Sapienza, 1997), showing no support for the presence of process conflict found by Jehn (1995). To my knowledge only the research by Jehn and associates have found the dimension of process conflict and future studies can test when this conflict type exist.

This thesis also highlights that the current way of describing team processes is too unwieldy because many processes, including task conflict, relationship conflict, emotional identity and goal congruence identity are highly correlated. A parsimonious model should be developed, such as a two-factor structure comprising the team's ability to focus on common objectives and the ability of members to avoid non-task related differences suggested in chapter 4. However, this thesis does not test the model, a task that is left for future research.

The study supports previous studies (e.g., Van de Ven, 1986) that in non-routine tasks, dividing tasks such that members are generalists rather than specialists is beneficial for team performance. This study adds to the literature by showing that in addition to task specialization or generalization, a hybrid form of organizing combines both specialization and generalization. The effect of this mode of labor division for new venture teams is to get performance benefits of generalization without the negative performance effects of task specialization.

The thesis also replicates existing studies that both internal (e.g., West and Anderson, 1996) and external (e.g., Louis and Yan, 1996, Ancona and Caldwell, 1992a and 1992b) factors influence performance. It also adds to the literature by showing that both factors need to be studied together since without controlling for internal factors, few of the external factors influence performance. In addition, while many existing studies (e.g., Louis and Yan, 1996) have argued that external factors predict performance, this study adds to the literature by showing how external factors matter. The thesis also shows that some social capital concepts (e.g., strong and weak ties) can be integrated with the team literature. Future studies can explore whether other social capital concepts such as density and centrality can also be used to better understand the effects of external contacts on team performance.

Finally, the study partially replicates existing studies (e.g., West and Anderson, 1996) that for small teams, size positively predicts performance. However, when external factors are included, size does not predict performance. One explanation is that the resources external contacts bring into the teams have accounted for the benefits of larger teams. However, this assertion is only tentative and future studies can explore how team size influences performance and whether external resources can substitute for internal resources.

Comparing Results With the New Venture Literature

As a whole, this thesis adds to the new venture literature because little research has been done on new venture teams (Cooper and Daily, 1996). In addition, this thesis adds to the factors that influence early start-up success, a period that has received limited attention (Reynolds, 1996) but is an important stage because early experiences shape future routines (e.g., Stinchcombe, 1965; Burton, 1995:13), culture (e.g., Schein, 1983) and performance (e.g., Eisenhardt and Schoonhoven, 1990). In particular, this thesis adds to the new venture team literature by showing how members should design internal processes and structures and engage people outside the team.

The thesis shows that short-term entrepreneurial teams that have good internal processes as indicated by high levels of internal task processes, team holding, identity and low conflict levels, have high member performance ratings. While this finding is not surprising, a surprising finding is that higher holding levels in entrepreneurial teams predict lower externally-rated performance. One reason for this finding is that team members tend to choose among people that

they know (Shah and Jehn, 1993) and as a consequence, too much internal focus could lead to groupthink (Janis, 1982). One tentative conclusion from this study is that the entrepreneurial context is important to study because this context moderates the effects of different factors on performance. This conclusion is only tentative because no other context is studied in the thesis.

In addition, the study replicates other studies (e.g., Vyakarnam et al., 1997) that entrepreneurial teams are small, suggesting that larger entrepreneurial teams should perform better than smaller teams. In addition, the study finds that there are benefits of having diverse membership (for external evaluations). While there is some evidence that members are aware of the need to build a diverse team as illustrated by a member (INT 13) that the team has to be "as diverse as possible, diverse in [both] the technical side and in the business development side," the study finds that members tend to choose among those with similar functional backgrounds and organizational affiliation. In INT 13 for example, all the team members were MIT students with engineering majors. A caveat is that this is a short-term entrepreneurial team and future studies should explore whether over the long term entrepreneurial teams become more or less diverse.

However, resources can be gathered not only within the team but also through contacts with people outside the team. This study replicates the findings in the entrepreneurship literature, both the popular press (e.g., by Stevenson, Cruikshank and Moldoveanu (1998) titled *Do lunch or be lunch*) and the academic research (e.g., Dubini and Aldrich, 1991), that external factors influence entrepreneurial success. However, the study also finds that entrepreneurial teams must engage external contacts strategically by gathering a wide range of information and to do that efficiently. A tentative conclusion is that while entrepreneurs must "do lunch or be lunch," the

findings in this study suggest that team members should also watch how and whom they do lunch with.

Finally, this study supports other studies (Haar, Starr and MacMillan, 1988) that there are industry effects on new venture performance, finding that ventures in technology related plans have lower externally-rated performance than non-technology related plans. While this is only a control variable and therefore no hypothesis is presented, the finding is surprising because many people (e.g., Rosegrant and Lampe, 1992) have associated the Boston region as a hotbed of high-technology start-ups. However, this finding of the benefits of non-high-technology firms on performance is only tentative because the teams are only in the planning stages. It is possible that during the implementation phase, potential investors will first decide to invest in high-technology firms, before choosing among the better-conceived high-technology plans.

LIMITATIONS OF STUDY POINTING TO AREAS FOR FUTURE RESEARCH

The last section of this thesis discusses the limitations of this study and highlights opportunities for future research. In particular, the section discusses the limitations of thesis coverage, the thesis sample and the research method.

Limitations of Coverage

Since this thesis is an exploratory study of the factors influencing entrepreneurial team performance, a broad range of factors was covered, with the consequence that only a limited

number of variables could be studied for each factor. For example, in team diversity, only one type of functional diversity and one type of non-functional diversity were studied. Future studies can explore each of these areas in greater detail to get more in-depth understanding of how each factor influences new venture team performance. Moreover, there were high correlations among the internal factors suggesting that some of these internal factors might not be different processes. Future studies can develop more parsimonious models of team processes and use scales derived from these models to better understand team performance.

Limitations of Sample

Chapter 3 argues that a business plan competition within MIT is a suitable sample because it overcomes some problems of studying entrepreneurial teams including left censoring biases, population identification and low response rates. In addition, the characteristics of the sample resemble that of other entrepreneurial teams. However, there were several limitations of using this sample. First, many of the participants were highly educated and wrote technology-related plans. Thus it is uncertain whether the study's results are applicable to samples comprising of less high-technology based products. As a first step towards increasing the generalizability of the findings, future studies can replicate the study with other business plan competitions. This should be easy to do given that there are over 50 business plan competitions in the U.S. (Ballon 1998a, Ballon, 1998b). In addition, to test the generalizability of the findings outside of business plan competitions, future research should also use other types of start-up teams, such as founding teams from a sample of incubator company spin-offs.

Second, these are short-term teams and the results might not apply to teams in later stages of development. For example, while weak ties (i.e., acquaintances rather than family members) can improve early stage performance, it is possible that strong ties may be beneficial at later stages of development. Roberts (1992a) for example, surmise that many new ventures get funding support from friends and family. Future studies can study the teams over time to determine how internal and external activities predict performance over different team stages.

Third, the participants might have different motivations for joining the competition and some participants might join the competition to gain experience in preparing a business plan, with no intention of starting a business. However, this problem was minimized by the competition's structure since the winners received half the prize money upon incorporation and the remainder after demonstrating sufficient progress in their business ventures (sufficient progress was left to the judges to determine). Future studies can also gather questions on the participants' intentions for joining the competition and to use these intentions to control for member motivations.

Limitations of Method

The high response rate in this study increased the confidence that the findings accurately reflected the sample under scrutiny. In addition, the researcher was involved in the competition as an organizer thereby increasing the amount of "inside" knowledge. However, there were several limitations in the way the data were collected. First, information from team members were collected only after the participants' submitted their entries and the time lapse between

actual team activities and the submission deadline could result in recall biases. These biases were compounded by the fact that some data were collected after the competition results were announced. Future studies could collect information from the participants several times over the competition process. For example one approach is to collect information through weekly logs that tracked developments in team processes, structures and contacts with external contacts. This method while increasing the richness of information collected would also minimize recall bias.

Second, while this study is on new venture teams in the early start-up phase, the teams were tracked only after they had been formed and little was known about the team pre-formation stage. Tracking teams from the pre-formation stage could lead to a better understanding of factors that facilitated (or hindered) individuals in forming successful teams. For example, future studies could track individuals from the time they indicate interest in participating in the competition (e.g., they attend the competition events). A limitation of the approach is that the population of nascent entrepreneurs is not known, a weakness that can be mitigated by getting potential participants register their interest to participate in the competition a few months before the competition deadline. Another possibility is to track individuals who approach agencies that assist nascent entrepreneurs, such as the Singapore Trade Development Board, over time.

Third, the interviews only provide illustrations of team activities. More intensive interviewing would enable the research to not only use these interviews for illustrative purposes but to further understand new venture teams. For example, interviews with at least two members of every team could be conducted. This would increase the chances that the interviews reflect the views of the sample and allow the creation of a measure of within team agreement on team

processes. In addition, the interviews should be started early in the competition process to minimize recall bias and not after the competition deadline as was the case in this study.

Finally, there were some limitations in the treatment of variables in the models. First, only first order models were developed in this study. Some variables, such as size and team holding could have curvilinear performance effects. However, these could not be modeled in this study because of the high correlations among the variables and their squared term. Further, some variables such as quality of external contact and the frequency of interaction could have interaction effects on performance. Again, these interaction effects were not modeled because of the high correlations between the variables and their interaction terms. Future studies with greater variances in these variables (or larger sample sizes) can explore the curvilinear and interaction effects of these variables on entrepreneurial team performance. Second, only a few control variables were included because of the small sample size. Future studies with larger sample sizes could include more control variables so that competing explanations for entrepreneurial team performance can be ruled out (for example some researches [e.g., Becherer and Maurer, 1999] argue that personalities can influence entrepreneurial success). Third, more fine-grained measures of some control variables, such as industry, can be developed. In this study a dichotomous variable of "high-technology" versus "non-high-technology" industry control was used. A consequence was that different high-technology firms (e.g., computer hardware and biotechnology) and different low-technology firms (e.g., funeral services and volunteer services) were grouped together. Nevertheless, the relatively simple measure resulted in significant and consistent performance differences between these industries.

To conclude, this dissertation explores how different facets of short-term entrepreneurial team activities influence performance with Figure 7.2 as the main study output. Future studies can test this model and to increase both the breadth and depth of coverage. Other than the theoretical contributions highlighted in the papers, the study gives some tentative suggestions as to how members of early stage entrepreneurial teams can build high-performing ventures. Entrepreneurial teams in this stage need to design good structures and processes and to develop a network of contacts. In particular, entrepreneurial teams should be designed to divide tasks such that members are generalists rather than specialists. Members of entrepreneurial teams should also build teams with clear objectives and high levels of team identity. However members should be cognizant that too much focus on internal factors could be detrimental to entrepreneurial team performance. While cultivating external contacts, members of entrepreneurial teams must be aware of the need to gather a wide range of information, and develop "weak" rather than "strong" ties. Although the advice given above might seem obvious, the actions of the nascent entrepreneurs in this study suggest otherwise. Members tend to build small teams, are not aware of the need to assign tasks to generalists and for efficient information gathering.

Figure 7.1. Preliminary Model of the Internal and External Factors Influencing Entrepreneurial Team Performance

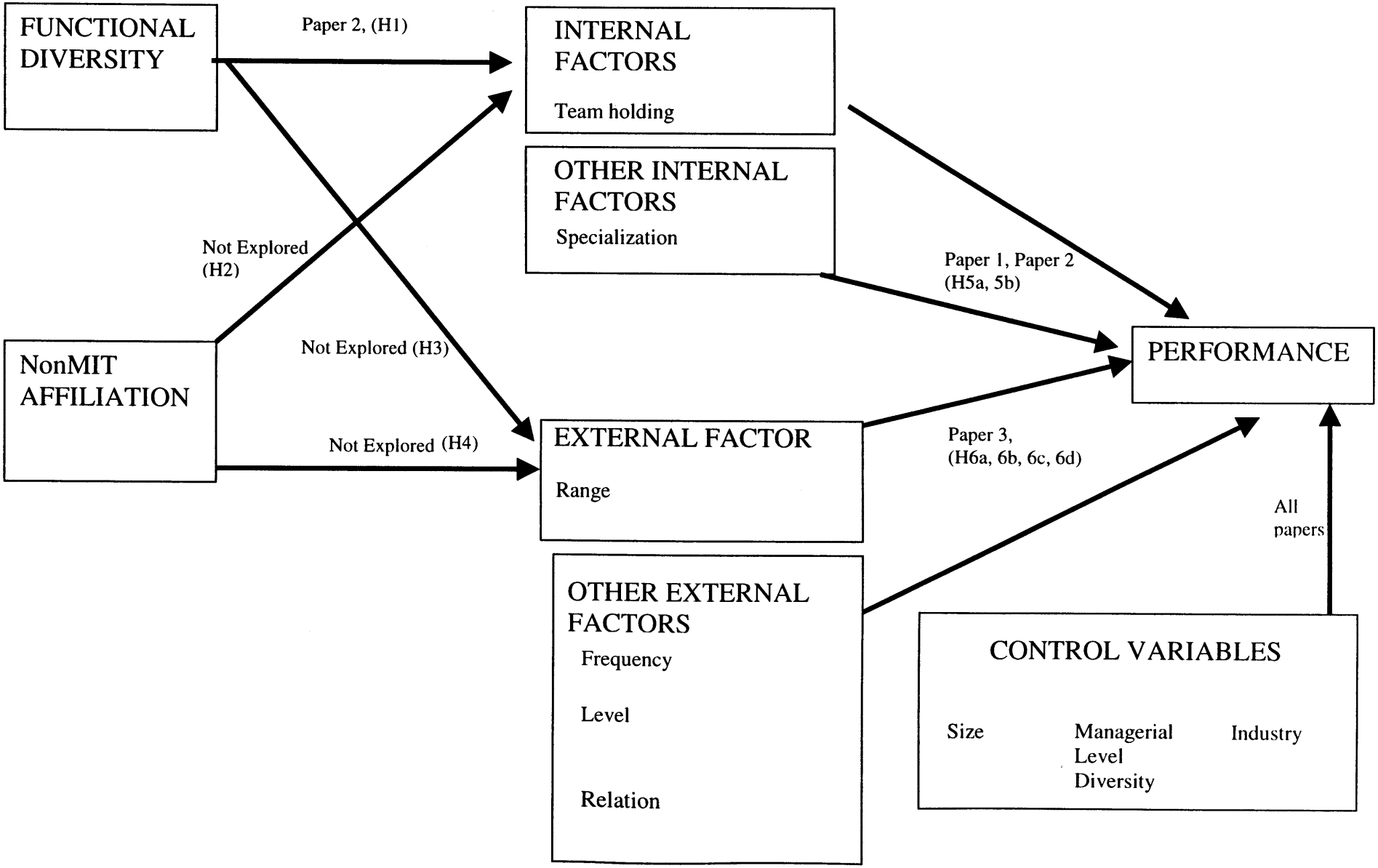
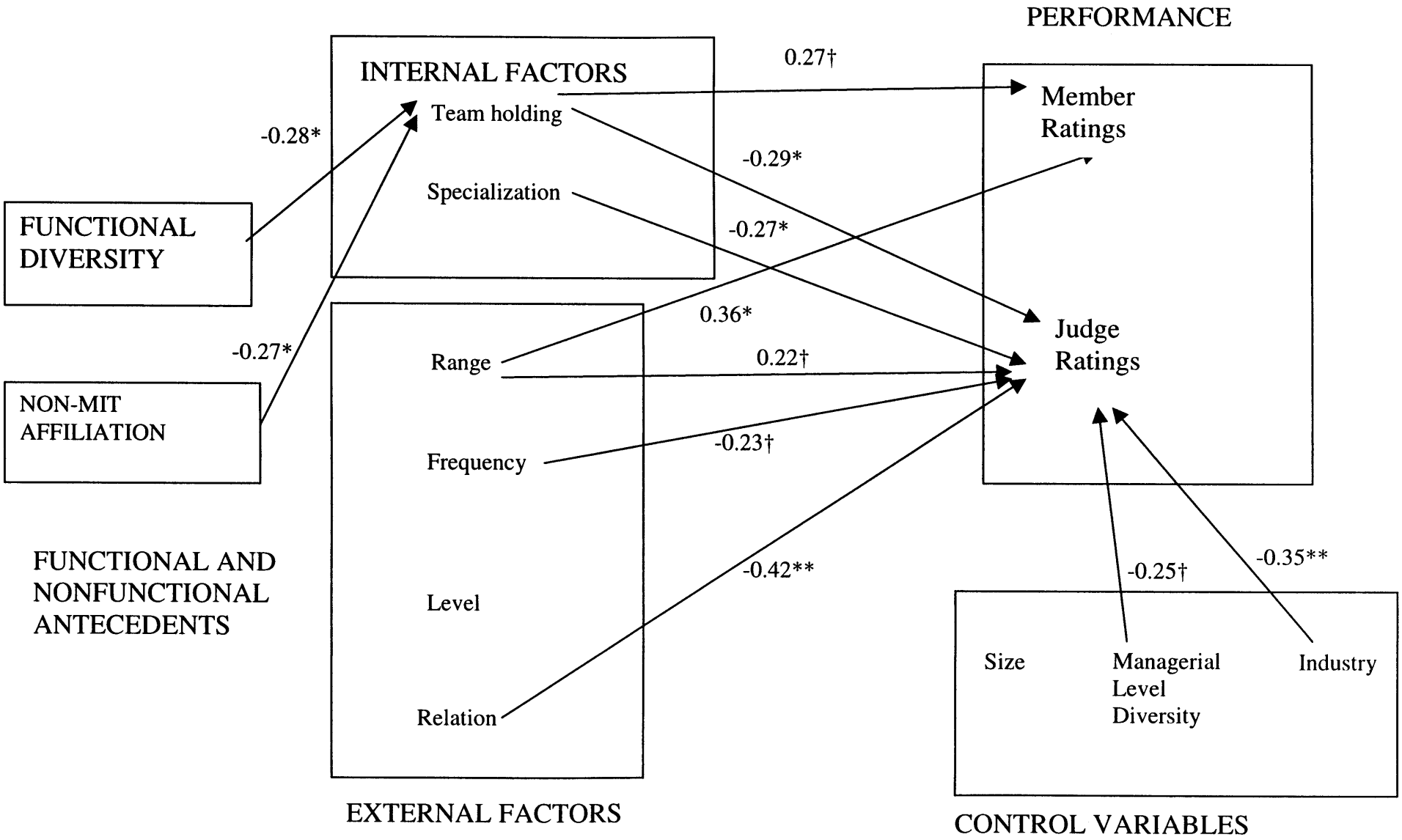


Figure 7.2. Revised Preliminary Model of the Internal and External Factors Influencing Entrepreneurial Team Performance



**=p<.01, *=p<.05, †=p<.10

Table 7.1. Descriptive Statistics and Bivariate Correlations for the Dependent and Independent Variables.

	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Judges' Ratings of Performance (JudRate)	2.95	0.55	1												
2 Member-Ratings of Performance (MemRate)	4.93	0.66	0.24	1											
3 Size (Size)	4.05	1.8	0.19	-0.12	1										
4 Industry (Industry)	0.77	0.43	-0.4	-0.1	0.02	1									
5 Managerial Level Diversity (CoyLvl)	0.68	0.31	0.13	-0.04	0.18	-0.24	1								
6 Team Holding (Hold)	5.27	0.86	-0.17	0.46	-0.27	0.04	-0.18	1							
7 Level of Specialization (Spec)	0.38	0.18	-0.22	-0.03	0.04	-0.01	0.09	0.2	1						
8 Range of External Contacts (Range)	0.29	0.25	0.22	0.26	0.25	-0.07	0.23	-0.03	-0.03	1					
9 Experience Level of External Contacts (Level)	2.48	0.57	0.19	0.15	0.12	-0.02	-0.05	0	-0.15	0.3	1				
10 Frequency of Contact (Freq)	1.79	0.91	-0.1	0.05	0.06	0.01	0.15	-0.28	-0.08	0.2	0.03	1			
11 Relationship with Contact (Relation)	2.23	0.66	-0.23	0.12	0.02	0	0.02	0.03	0.14	0.19	0.07	0.04	1		
12 Functional diversity (Functional)	0.59	0.24	0.09	-0.05	0.35	-0.05	-0.37	-0.30	-0.03	0.01	-0.21	0.05	0.12	1	
13 Extent NonMIT Affiliation (NonMIT)	0.19	0.21	0.22	-0.16	0.21	0.02	0.26	-0.29	0.17	0.12	-0.01	0.10	0.20	0.06	1

Correlations of .24 and above statistically significant at $p < 0.05$ level (2-tailed)

Correlations of .35 and above statistically significant at $p < 0.01$ level (2-tailed)

Table 7.2. Regressions Predicting the Effects of Team Internal and External Factors on Judges' Ratings of Entrepreneurial Team Performance

Variables	Model 1			Model 2			Model 3			Model 4		
	Beta	(S.E.)	t	Beta	(S.E.)	T	Beta	(S.E.)	t	Beta	(S.E.)	t
Size	0.17	0.04	1.18	0.07	0.04	0.55	0.06	0.04	0.49	0.09	0.04	0.77
Industry	-0.37	0.2 **	-2.56	-0.39	0.18 **	-3.02	-0.37	0.15 **	-3.27	-0.35	0.15 **	-3.13
CoyLvl	-0.14	0.3	-0.99	-0.22	0.27	-1.63	-0.22	0.24 †	-1.85	-0.25	0.28 †	-1.87
Hold				-0.28	0.09 *	-2.06	-0.33	0.08 **	-2.75	-0.29	0.09 *	-2.21
Spec				-0.34	0.39 **	-2.7	-0.23	0.35 *	-2.04	-0.27	0.36 *	-2.28
Range							-0.4	0.1 **	-3.52	0.22	0.30 †	1.73
Level							0.23	0.3 †	1.87	0.10	0.11	0.82
Frequency							-0.23	0.07 †	-1.98	-0.23	0.07 †	-1.97
Relation							0.1	0.11	0.85	-0.42	0.10 **	-3.67
Functional										-0.07	0.35	-0.50
NonMIT										0.16	0.32	1.38
R2		0.15			0.36			0.57			0.59	
F-stats		2.56 *			4.53 **			5.45 **			4.69 **	

**=p<.01, *=p<.05, †=p<.10

Table 7.3. Regressions Predicting the Effects of Team Internal and External Factors on Member-Ratings of Entrepreneurial Team Performance

Variables	Model 5			Model 6			Model 7			Model 8		
	Beta	(S.E.)	t	Beta	(S.E.)	T	Beta	(S.E.)	t	Beta	(S.E.)	t
Size	-0.14	0.05	-0.93	-0.09	0.05	-0.64	-0.09	0.05	-0.62	-0.18	0.05	-1.21
Industry	-0.16	0.21	-1.05	-0.14	0.21	-0.99	-0.12	0.2	-0.82	-0.11	0.20	-0.82
CoyLvl	-0.25	0.32	-1.67	-0.2	0.32	-1.35	-0.26	0.32 †	-1.77	-0.14	0.36	-0.85
Hold				0.23	0.11	1.54	0.26	0.11 †	1.68	0.27	0.12 †	1.617
Spec				-0.22	0.46	-1.57	-0.14	0.46	-0.96	-0.10	0.46	-0.72
Range							0.32	0.4 *	2.01	0.36	0.40 *	2.282
Level							0.04	0.15	0.25	0.07	0.15	0.46
Frequency							0.13	0.09	0.87	0.11	0.09	0.777
Relation							0.02	0.13	0.14	0.03	0.13	0.22
Functional Diversity										0.25	0.46	1.467
NonMIT										-0.16	0.42	-1.07
R2	0.1			0.18			0.32			0.36		
F-stats	1.56 n.s.			1.85 n.s.			1.92 †			2.02 *		

**=p<.01, *=p<.05, †=p<.11

Table 7.4. Effects of Functional Diversity on Range of Information Gathered From External Contacts and Team Holding.

Variables	Model 9 Range Information			Model 10 Team Holding		
	Beta	(S.E.)	T	Beta	(S.E.)	t
Size	0.46	0.01 **	4.24	-0.12	0.06	-0.94
Industry	-0.14	0.06	-1.29	-0.03	0.24	-0.25
CoyLvl	-0.36	0.08 **	-3.22	-0.24	0.36 †	-1.89
CoFunc	-0.09	0.09	-0.79	-0.28	0.51 *	-2.17
R2		0.27			0.15	
F-stats		6.32 **			2.99 *	

**=p<.01, *=p<.05, †=p<.10

Table 7.5. Effects of Non-Functional Diversity on Range of Information Gathered From External Contacts and Team Holding

Variables	Model 11			Model 12		
	Range Information			Team Holding		
	Beta	(S.E.)	t	Beta	(S.E.)	t
Size	0.22	0.02 †	1.87	-0.22	0.05 †	-1.95
Industry	-0.02	0.07	-0.20	0.01	0.23	0.06
CoyLvl	0.19	0.10	1.55	-0.06	0.34	-0.52
NonMIT	-0.03	0.15	-0.26	-0.27	0.48 *	-2.27
R2		0.10			0.15	
F-stats		1.89 n.s.			3.11 *	

**=p<.01, *=p<.05, †=p<.10

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APPENDICES

Appendix 1. List of Judges for the MIT $50K Competition

Name	Affiliation
Brad Feld	Partner, Softbank Ventures and Founder, Intensity Ventures
Mark Gorenberg	Partner, Hummer Winblad Venture Partners
Joseph Hadzima Jr.	Senior VP, Quantum Engery Technologies
Dan Hart	Founder, Fundamental
Adam Honig	Founder and President, Open Environment Corporation, C-bridge Internet Solutions
Mitch Kapor	Founder, Lotus Development Corporation and Co-founder, Electronic Frontier Foundation
Omar Khudari	Founder, Papyrus, Viaweb
Duncan McCallum	Partner, OneLiberty Ventures
Ed Miller	Partner, Testa, Hurwitz and Thibeault
David Morgenthaler	Founder, Morgenthaler Ventures
Jean Notis-McConarty	Partner, Coopers and Lybrand
John Piccione	Partner, Sullivan and Worcester
Edmund Pitcher	Partner, Testa, Hurwitz and Thibeault
E. Robin Plumer	Partner, Wolf, Greenfield and Sacks
J. William Poduska	Founder, Prime Computer, Apollo Computer
Dan Roach	Director of High Technology Services, Coopers and Lybrand
Dan Schwinn	Founder, Shiva Corporation, Avidyne Corporation
Blair Whitaker	Partner, Norwest Venture Capital
George Zachary	Partner, Mohr, Davidow Ventures

Appendix 2. Form Used by the Judges to Evaluate the Teams

1998 MIT $50K Entrepreneurship Competition

Full Business Plan Feedback

Team Name [Replace with team name] **Judge Name** [Replace with your full name. Include how you would like teams to contact you (if at all) - e.g. at final awards on 5/7, via email, call to arrange 15 min. conference call, etc.]

Overall Business Idea
[Replace this text with at least 1) one thing the team did well, 2) one constructive suggestion to help the team move forward, and 3) one overall burning question.]

Opportunity Statement/Elevator Speech
[Replace this text with at least one burning question.]

Market Opportunity and Strategy
[Replace this text with at least one burning question.]

Competitive Position
[Replace this text with at least one burning question.]

Product
[Replace this text with at least one burning question.]

Execution: Financial/Operational/Team
[Replace this text with at least one burning question.]

Presentation
[Replace this text with an assesment of the presentation of the executive summary and the full business plan. **NOTE: This is an evaluation of the presentation, not the content.**]

Quick Check
In this executive summary, does the team clearly: (place an X in the box, 5 is better)

	Poor				Better		Poor				Better
	1	2	3	4	5		1	2	3	4	5
1. Define the customer						6. Differentiate from competitors					
2. Say who pays for the product/service						7. Protect the competitive advantage					
3. Show high potential						8. Balance the team					
4. Describe the product/service						9. Substantiate claims					
5. Analyze the competitors						10. Quantify the business model					

Additional Comments

Appendix 3. Questionnaire sent to the MIT $1K participants in November 20, 1997

MIT $50K ENTREPRENEURSHIP COMPETITION

Survey of Participants' Personal and Team Information

20 November 1997

Dear $1K Warm-Up Business Idea Competition participant,

This questionnaire seeks to understand Teambuilding issues among participants of the MIT $50K Business Plan Competition. The information will be used to improve the management of the MIT $50K Competition and the data for Maw Der's Ph.D. thesis. The survey should take about 20 to 25 minutes to complete. Please mail the survey by 04 December 1997 to the address below.

Your responses will be kept completely confidential. Only the lead investigators of the $50K Teambuilding project will have access to the information. Your data is important and we hope that you will fill the questionnaire as completely as possible. You may however skip any question you do not wish to answer.

In each section, you will be given specific instructions. Please answer each question as best and frankly as you can. Some of the questions will seem repetitive. This is not to test you; rather it is a method researchers use to measure opinions more effectively. Feel free to jot comments in the margin if any of the questions prompt additional thoughts.

Thank you in advance for your cooperation. We hope you will find the questionnaire interesting and thought provoking. Use the enclosed envelope to return the questionnaire via interdepartmental mail to Maw-Der Foo. If you do not have access to interdepartmental mail, use regular mail and the cost of postage will be refunded to you.

Maw-Der Foo
MIT Sloan School of Management
50 Memorial Drive, Room E52-511
Cambridge, MA 02139
(617) 253-6680
foomd@mit.edu

Thank you for completing this survey. Please mail your responses by 04 December 1997. As a token of our appreciation, a small gift will be given to you for your kind participation.

Name : **Team Name :**

Throughout this questionnaire, questions will refer to your team. When answering questions about your team, please consider **only** the people listed below as part of your team.

1. **Names of team members omitted in this appendix**
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.

If you feel that other individuals who are not listed above have been integral members of the team, write their names below. However, when answering the questionnaire **DO NOT** include them in the team. Thank you.

_____ _____

_____ _____

_____ _____

Section 1

Listed below are some statements that could describe how your team goes about carrying out its tasks. Try to be as objective as you can in considering each statement – regardless of whether you like or dislike being on this team.

Write a number in the blank for each statement, based on this scale :

1	2	3	4	5	6	7
Very Inaccurate	**Mostly Inaccurate**	**Slightly Inaccurate**	**Uncertain**	**Slightly Accurate**	**Mostly Accurate**	**Very Accurate**

____Coord1. Team members do a good job coordinating their activities.

____Mix1. Members of this team are so different from one another that we have serious difficulties even understanding one another.

____Strat1. Our team comes up with innovative ways of proceeding with the work that turn out to be just what is needed.

____Int1. The team is able to define its goals.

____Coord2. The team has done a good job of figuring out how work will flow among team members.

____Strat2. This team is able to change the way we work when a problem requires a different approach.

____Int2. The team is able to develop workable plans.

____Mix2. Members of this team are so much alike that it is as if we are peas from the same pod.

____Coord3. Team members have developed effective plans and procedures to coordinate work.

____Int3. The team is able to prioritize work and determine which aspects of the work are important.

____Mix3. This team has a good "mix" of members – a diverse set of people who bring different perspectives and experiences to the work.

Section 2

This section asks you about how tasks are allocated and decisions are made in the team.

1. Put an [X] against the statement that best describes how your team makes main decisions.

____One member makes most of the key decisions for the team.

____One member makes most of the key decisions for the team after consulting other team members individually, without bringing the team together as a group.

____One member makes most of the key decisions for the team after consulting all team members as a group.

____Team decision making is shared but members have greater influence in their areas of specialization.

____The team makes most decisions together as a group.

2. Estimate the length of time that you spent working on $1K activities:

Eff1. How many hours did you spend working with your team during the last week of the $1K competition? ____ hours.

Eff2. How may hours did you spend working individually during the last week of the $1K competition? ____ hours.

Eff3. What percentage of team meetings did you attend during the last week of the $1K Competition? _____ percent

Task Allocation

3. Teams divide up work differently. We hope to understand how your team allocates tasks. In the table below list the tasks each member specializes in. Give an overall evaluation whether each member is a team specialist, generalist or both. A specialist participates in a few key tasks or decisions. A generalist participates in the full range of team decisions and tasks. Three examples are shown below.

Team Member	**Tasks member specializes in**	**Specialist**	**Generalist**
Peter Smith	Focuses mostly on financial projections and marketing plan	X	
Jane Louis	Participates in all tasks except developing prototype. Considered to be team leader.		X
Doug Joe	Participates in all tasks and focuses on writing computer codes	X	X

Section 3 – Team external relations

Developing a business concept often involves the assistance of people outside the team. In the table below, list all the people that were important to your team during the $1K competition. Include the position they hold, the type and extent of interaction and prior relationship. Add more rows if necessary. Two examples are shown.

Name	Position	Type and extent of Interaction	Prior relationship
Ed. Roberts	Prof. in Sloan School, Management of Technology	Team member Peter meets with him on average once a week to get feedback on the development of our business concept.	Took his Management of Technology class.
Margaret Smith	Financial controller, IBM	I called her once to check method to do financial projections.	Mother of my MIT course 6 classmate.

Write a number in the blank for each statement, based on this scale :

1	2	3	4	5	6	7
Very Inaccurate	**Mostly Inaccurate**	**Slightly Inaccurate**	**Uncertain**	**Slightly Accurate**	**Mostly Accurate**	**Very Accurate**

____BM1. This team does a good job obtaining the resources needed to do its work.

____BM2. Team members take it upon themselves to go to external resources to obtain needed materials, personnel, or information.

____BM3. Members of this team are good at interacting with outside sources to get information to aid in determining what the product or service should be.

____BM4. It is often hard to figure out who is and who is not a member of this team.

____BM5. Members of this team clearly view themselves as a team of people who work closely together, not as a collection of individuals who have their own particular job to do.

____BM6. To what extent has this team tried to create a clear sense of identity and purpose?

____BM7. To what extent has this team made an effort to develop an image that distinguishes it from other teams?

Section 4 – Team functioning

Below are a number of statements that could describe how members of a team work together. Please indicate how accurately each statement describes the dynamics in your team.

Write a number in the blank for each statement, based on this scale :

1	2	3	4	5	6	7
Very Inaccurate	**Mostly Inaccurate**	**Slightly Inaccurate**	**Uncertain**	**Slightly Accurate**	**Mostly Accurate**	**Very Accurate**

____SocIn1. The members of the team are quick to defend each other from criticism by outsiders.

____SocIn2. The successes of other members of the team help me achieve my own objectives.

____SocIn3. Everyone's input is incorporated into the most important team decisions.

____SocIn4. The members of the team get along very well.

____SocIn5. Relationships between members of the team are best characterized by "win-lose"; if he/she wins, I lose.

____SocIn6. The members of the team are always ready to cooperate and help each other.

____SocIn7. When final decisions are reached, it is common for at least one member of the team to be unhappy with the decision.

____SocIn8. There is a great deal of competition between members of the team.

____SocIn9. The members of the team really stick together.

Not Much at all						**A Lot**
1	**2**	**3**	**4**	**5**	**6**	**7**

____ConR1. How much friction was there among team members?

____ConT1. How often do people in your team disagree about opinions regarding the work being done?

____ConP1. To what extent did you disagree about the procedures in your team?

____ConR2. How much were there personality conflicts among team members?

____ConT2. How frequently are there conflicts about ideas in your team?

____ConP2. To what extent did you disagree about the way to do things in your team?

____ConR3. How much tension was there among team members?

____ContT3. How much conflict about the work you do was there is your team?

____ConP3. How frequently were there disagreements about who should do what in your team?

____ConR4. How much emotional conflict was there among team members?

____ContT4. To what extent are there differences of opinion in your work unit?

Section 5 – Individual and team outcomes

Each of the statements below is something that a person might say about his or her team. Please indicate you own personal feelings about your team.

Write a number in the blank for each statement, based on this scale :

1	2	3	4	5	6	7
Very Inaccurate	**Mostly Inaccurate**	**Slightly Inaccurate**	**Uncertain**	**Slightly Accurate**	**Mostly Accurate**	**Very Accurate**

____Iden1. I identify with this team.

____Iden2. I am glad to belong to this team.

____ Iden3. I feel held back by this team.

____ Iden4. I think this team worked well together.

____ Sat1. I am satisfied with this team.

____ Iden5. I see myself as an important part of this team.

____ Iden6. I do not fit in well with the other members of this team.

____ Iden7. I do not consider the team to be important.

____ Iden8. I feel uneasy with the members of this team.

____ Iden9. I feel strong ties to this team.

Sat2. Circle the face that best describes your feelings toward the team.)):): 😐 (: (:

How does your team rate on each of the following?

Write a number in the blank for each statement, based on this scale :

1	2	3	4	5	6	7
Deeply disappointing						**Exceeds my my expectations**

____Perf1. Efficiency of team operations.

____Perf2. Quality of work we produce.

____Perf3. Number of innovations or new ideas introduced by the team.

____Perf4. Our adherence to schedules.

____Perf5. Our reputation for work excellence.

____Perf6. Our overall performance.

Thank you for completing this survey. Mail your responses to be received by 04 December 1997.

Appendix 4. Email Sent to the MIT $50K Participants on February, 26 1998 Informing Them that a Questionnaire Would be Sent to Them.

Dear $namefile$,

[Note: The email program automatically substitutes $name$ with the participant's name, so that each participant is addressed by name]

Teams participating in the $50K Competition have started many businesses with over $30 Million invested in them. Unfortunately, little is known about the influence of the teams' early experiences and their ability to start successful companies.

You are one of the participants in a competition that will lead to future leading firms. As such, we hope to have your opinion on team issues that you faced during this competition. Given the diverse characteristics of the participants, it is essential that we get your views so that a complete picture of levers of team success can be determined. This study is sponsored by the Kauffman Foundation and the MIT $50K Competition.

A questionnaire seeking your experiences during the Executive Summary phase of the $50K competition is being sent to you. If by any chance you do not receive this questionnaire by Tuesday, Mar 4 1998, please email me at foomd@mit.edu or call (617) 253-6680. I will make sure that a copy will be sent to you immediately.

Sincerely,
Maw-Der Foo
Project Coordinator

Appendix 5. Questionnaire Mailed to the MIT $50K Participants on February 27, 1998 Requesting that they Return it by March 8, 1998.

Massachusetts Institute of Technology
Sloan School of Management
Behavioral & Policy Sciences

Room E52-511
50 Memorial Drive
Cambridge, MA 02139

Telephone: (617) 253-6680
Facsimile: (617) 253-2660
E-Mail: foomd@mit.edu

[Team Name] Feb 25, 1998

Dear [Participant Name],

Past participants of the MIT $50K Competition have started over 26 companies with over $30 million invested in them. What are the factors that facilitate the transition from business plans to new venture formation? How did the teams work together during the pre-firm phase of existence? How did they make use of internal and external resources? How did the teams perform? Unfortunately, little is known about the early experiences of the teams participating in the MIT $50K Competition.

You are one of the people that are being asked to give your opinion about your team experiences in this competition. The $50K Competition is participated by a wide range of people from undergraduate to graduate students as well as non-students. In order that the results will truly represent the early experiences of a wide range of participants, it is important that each questionnaire be completed and returned. Over the course of the $1K competition, the questionnaire has been pre-tested for its ability to predict team performance.

You are assured of complete confidentiality. The questionnaire has an identification number for matching purposes only. This is so that we may check your name off the mailing list when your questionnaire is returned. Your identity will never be placed on the questionnaire.

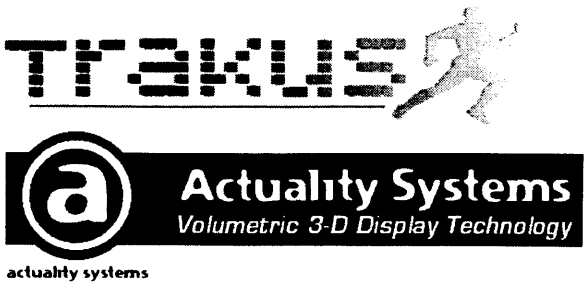
The results of this research will be made available to the sponsors of this project, the Ewing Marion Kauffman Foundation and the MIT $50K Competition. Only summaries will be reported and no teams will be identified. Your responses will in no way affect your performance in the competition. You may receive a summary of results by writing "copy of results requested" on the back of the return envelope, and printing your name and address below it. Please do not put this information on the questionnaire itself.

I will be most happy to answer any questions you might have. Please write, email or call. The email address is foomd@mit.edu and the telephone number is (617) 253-6680.

Thank you for your assistance. Enclosed is a small gift as a token of our appreciation.

Sincerely,

Maw-Der Foo
Project Coordinator



Building Tomorrow's Leading Firms :

Alumni of the MIT $50K Competition have started successful companies. What common characteristics did these teams have? How did they work together during the competition? What resources did they gather? How did the teams perform at this early stage? Understanding these questions is in essence the scope of this project.

Please answer the questions. If you wish to comment on any questions or qualify your answers, please feel free to use the space in the margins. Your comments will be read and taken into account.

The $50K Teambuilding Project is sponsored by the Ewing Marion Kauffman Foundation and the MIT $50K Competition.

Please return this questionnaire to :

Maw-Der Foo
MIT Sloan School of Management
Rm E52-511, Cambridge, MA 02139

Thank you for your help.

In the sections, you are asked about your team. Please consider only the people listed in your team entry as part of your team. A list of these people is in page 3 of this survey.

Section 1

Listed below are some statements that could describe how your team goes about carrying out its tasks. Please write a number in the blank for each statement, based on this scale:

1	2	3	4	5	6	7
Very Inaccurate	**Mostly Inaccurate**	**Slightly Inaccurate**	**Uncertain**	**Slightly Accurate**	**Mostly Accurate**	**Very Accurate**

____1. The team is able to define its goals.

____2. This team is able to change the way we work when a problem requires a different approach.

____3. This team has a good "mix" of members – a diverse set of people who bring different perspectives and experiences to the work.

____4. Our team comes up with innovative ways of proceeding with the work that turn out to be just what is needed.

____5. The team is able to prioritize work and determine which aspects of the work are important.

____6. Members of this team are so different from one another that we have serious difficulties even understanding one another.

____7. The team is able to develop workable plans.

____8. Members of this team are so much alike that it is as if we are peas from the same pod.

Section 2

This section asks you about how tasks are allocated and decisions are made in the team.

1. Please circle the number that best describes how your team makes main decisions.

    1 ONE MEMBER MAKES MOST OF THE KEY DECISIONS FOR THE TEAM.

    2 ONE MEMBER MAKES MOST OF THE KEY DECISIONS FOR THE TEAM AFTER CONSULTING OTHER TEAM MEMBERS INDIVIDUALLY, WITHOUT BRINGING THE TEAM TOGETHER AS A GROUP.

    3 ONE MEMBER MAKES MOST OF THE KEY DECISIONS FOR THE TEAM AFTER CONSULTING ALL TEAM MEMBERS AS A GROUP.

    4 TEAM DECISION-MAKING IS SHARED BUT MEMBERS HAVE GREATER INFLUENCE IN THEIR AREAS OF SPECIALIZATION.

    5 THE TEAM MAKES MOST DECISIONS TOGETHER AS A GROUP.

In the next three questions, please estimate the length of time that you spent during the last week of the executive summary phase of the competition:

2. How many hours did you spend working with your team? _____ HOURS

3. How may hours did you spend working individually?_____HOURS

4. What percentage of team meetings did you attend? _____ PERCENT

Section 2b

We hope to understand how your team allocates tasks. In the table below, would you please list the tasks each member specializes in. Please give an overall evaluation whether each member is a team specialist, generalist or both. A specialist participates in a few key tasks or decisions. A generalist participates in the full range of team decisions and tasks. Three examples are shown below.

Team Member	**Tasks member specializes in**	**Special-ist**	**Genera l-ist**
Peter Smith	Focuses mostly on financial projections and marketing plan	X	
Jane Louis	Participates in all tasks except developing prototype. Considered to be team leader.		X
Doug Joe	Participates in all tasks and focuses on writing computer codes	X	X

Team Member	Tasks member specializes in	Special-ist	Genera l-ist

Section 3a

Team external relations. Developing a business concept often involves the assistance of people outside the team. In the table below, would you please list all the people that were important to your team during this stage of the competition. Include the position they hold, the type and extent of interaction and prior relationship. Add more rows if necessary at the end of this booklet. Two examples are shown.

Name	**Position**	**Type and extent of Interaction**	**Prior relationship**
Ed. Roberts	Prof. In Sloan School, Management of Technology	Team member Peter meets with him on average once a week to get feedback on the development of our business concept.	Took his Management of Technology class.
Margaret Smith	Financial controller, IBM	I called her once to check method to do financial projections.	Mother of my MIT course 6 classmate.

Section 3b

Our next concern is about the team's perception of external relations. Please write a number in the blank for each statement, based on this scale :

1	2	3	4	5	6	7
Very Inaccurate	**Mostly Inaccurate**	**Slightly Inaccurate**	**Uncertain**	**Slightly Accurate**	**Mostly Accurate**	**Very Accurate**

____1. This team does a good job obtaining the resources needed to do its work.

____2. Team members take it upon themselves to go to external resources to obtain needed materials, personnel, or information.

____3. Members of this team are good at interacting with outside sources to get information to aid in determining what the product or service should be.

____4. It is often hard to figure out who is and who is not a member of this team.

____5. Members of this team clearly view themselves as a team of people who work closely together, not as a collection of individuals who have their own particular job to do.

____6. This team tried to create a clear sense of identity and purpose?

____7. This team made an effort to develop an image that distinguishes it from other teams?

Section 4

Another important purpose of this study is to learn more about how team members work together. Please indicate how accurately each statement describes the dynamics in your team.

Write a number in the blank for each statement, based on this scale :

1	2	3	4	5	6	7
Very Inaccurate	**Mostly Inaccurate**	**Slightly Inaccurate**	**Uncertain**	**Slightly Accurate**	**Mostly Accurate**	**Very Accurate**

____1. I identify with this team.

____2. I am glad to belong to this team.

____3. I feel held back by this team.

____4. I think this team worked well together.

____5. I am satisfied with this team.

____6. I see myself as an important part of this team.

____7. I do not fit in well with the other members of this team.

____8. I do not consider the team to be important.

____ 9. I feel uneasy with the members of this team.

____10. I feel strong ties to this team.

11. Circle the face that best describes your feelings)):): 😐 (: ((:
toward the team.

Write a number in the blank for each statement, based on this scale :

1	2	3	4	5	6	7
Not much at all						**A lot**

____12. How much friction was there among team members?

____13. How often do people in your team disagree about opinions regarding the work being done?

____14. To what extent did you disagree about the procedures in your team?

____15. How much were there personality conflicts among team members?

____16. How frequently are there conflicts about ideas in your team?

____17. To what extent did you disagree about the way to do things in your team?

____18. How much tension was there among team members?

____19. How much conflict about the work you do was there is your team?

____20. How frequently were there disagreements about who should do what in your team?

____21. How much emotional conflict was there among team members?

____22. To what extent are there differences of opinion in your work unit?

Section 5

Our next concern is the outcomes of your team.
Write a number in the blank for each statement, based on this scale :

1	2	3	4	5	6	7
Deeply Disappointing						**Exceeds My Expectations**

____1. Efficiency of team operations.

____2. Quality of work we produce.

____3. Number of innovations or new ideas introduced by the team.

____4. Our adherence to schedules.

____5. Our reputation for work excellence.

____6. Our overall performance.

Section 6

Finally, we would like to ask a few questions to understand your background.

1. Your sex (Circle number of your answer)
   1 MALE
   2 FEMALE

2. Your present age : _____ YEARS

3. Your race : (Circle number)
   1 WHITE/CAUCASIAN
   2 AFRICAN-AMERICAN
   3 HISPANIC
   4 AMERICAN INDIAN
   5 ASIAN
   6 ASIAN-AMERICAN
   7 OTHERS (PLEASE SPECIFY) : _____

4. Your nationality : _____

Is there anything else you would like to tell us about your team? If so, please use this space for that purpose.

Also, any comments you wish to make that you think may help us in future efforts to understand factors creating tomorrow's leading firms will be appreciated, either here or in a separate letter.

Your contribution to this effort is very greatly appreciated.

Please mail your responses by March 8 1998.

Appendix 6. Postcard Mailed to the MIT $50K Participants on March 5, 1998 Reminding Them to Complete the Questionnaire.

March 5, 1998

Last week a questionnaire seeking your opinion about team experiences in the $50K Competition was mailed to you. Your name was drawn from the participants in this competition.

If you have already completed and returned it to us please accept our sincere thanks. If not, please do so today. Because there are only a small number of participants, it is extremely important that yours also be included in the study if the results are to accurately represent the opinions of the teams.

If by some chance you did not receive the questionnaire, or it got misplaced, please call me right now, 617-253-6680 or email, foomd@mit.edu and I will get another one in the mail to you today.
Sincerely,

Maw-Der Foo
Project Coordinator

Appendix 7. Reminder Letter Mailed to the MIT $50K Participants on March 18, 1998 Requesting that They Complete the Questionnaire.

Massachusetts Institute of Technology
Sloan School of Management
Behavioral & Policy Sciences

Room E52-511
50 Memorial Drive
Cambridge, MA 02139

Telephone: (617)253-6680
Facsimile: (617) 253-2660
E-Mail: foomd@mit.edu

18 March 1998

Dear [participant name],

Yes, me again. I know we've been pushing, cajoling and pleading for responses to our questionnaire and you're probably tried of hearing from us. I apologize for adding to an already stressful time when you have many things to do.

But this is my dissertation and we are trying to learn about what makes $50K teams effective. So once again I am asking that you help us out and fill in the questionnaire.

If you could spare even a little bit of time - you will make a big difference in this research. Thanks and I hope you won't hear from me much more. In the event that your questionnaire has been misplaced, a replacement is enclosed.

Cordially,

Maw-Der Foo
Project Coordinator

P.S. A number of people have written to say that they had limited involvement with their teams during the Executive Summary phase of the competition. If this applies to you, please also complete the questionnaire because the questions mostly concern how you feel about your team rather than how much you know about certain things.

Appendix 8. Interview Guide Used in the Semi-structured Interviews from April 20, 1999 to May 5, 1999.

Interview Guide

General questions

1. How did the business concept evolve?

   Prompt :
   Who initiated it?
   How did it develop over time?
   Did the team have the concept before or after deciding to join the competition?

2. We are trying to understand the process through which a team is formed. Can you describe how each team member was identified? Which members knew one another before the team was formed? In what context and for how long?

   Prompt:
   Friend of a team member
   Someone that member have worked together in the past
   Introduced by someone? Who? Within or outside the team?
   Met at a $50K activity. Which activity?

3. Why that person was selected?

   Prompt :
   Was there a need that had to be filled?
   Was it a good friend or spouse that the team member wanted to include?
   Was it someone that team member had worked for and had good opinions about?
   Was it someone that the team member trusts?
   Team fit: what criteria?
   Credential? What credential?
   Industry or business experience? What experience?
   Specialized skill. What skill?
   Overall motivation and drive?

Team Activities

4. How many meetings did your team have? How long did each meeting last? Where did you meet?

5. Describe a typical team meeting.

   Prompt:
   Who is the lead person?
   How are decisions made?
   How are conflicts resolved?

6. What are the major activities of the team for the competition? How long did the team spend on the activity? What are the outcomes?

7. We are interested in the milestone events that have shaped your team.
   Milestones are those events or transitions that signal a clear change in the team. They are events that an historian of your team could not overlook. Examples might be a change of goals, leadership, a new product or losing an important team member. Please describe the important milestone events for your team, their approximate dates and why they occurred.

Team structure

8. How is work divided among team members?

9. What kinds of things do you do together? What things do you do separately?

10. What are the strengths and weaknesses of the team?

    Prompt:
    Comprehensive skills
    Member satisfaction
    Getting the job done successfully
    Good interpersonal processes
    Good performance

11. How serious is your team in setting up a business in future? Who has agreed to do that? Is this just a business plan contest to gain experience or a step towards starting a real business?

12. What is the biggest resource constraint in your team? What additional resources does the team need to perform well?

13. If there is one thing different that you could change in the team, what would that be?

External Members

14. The process of founding a new company often involves a number of external partners or advisors including lawyers, advisors, experienced entrepreneurs, $50K organizers, professors, fellow students. We would like to know who was involved in the founding of your team.

15. How did they become involved?

    Prompt:
    $50K Entrepreneurship Competition events. Which ones?
    Contacts? Which contacts?
    Relatives
    Friends, (in what context)
    Recommendations. Whose recommendations?
    Active search. How? Where?

16. The type of interaction with the external contacts.

    Prompt:
    How often and how long each meeting
    Where do they meet - in the person's office? With the team during their meetings?
    Are they still involved?

17. What did they contribute and how have they affected the team?

Prompt:
Business concept
Money
Advice – what advice
Financial planning or advice
Market planning or advice
Operations planning or advice
Technical planning or advice
Overall advice

Business Formation

18. What steps have your team taken toward the formation of a business?

Prompt:
Organized startup team
Devoted full time
Devoted part time
Asked for funding
Received financial support
Invested money
Looked for facilities
Applied license or patent
Looked into license or patent
Saved money to invest
Prepared plan
Formed legal entity
Hired employees
Rented facilities, equipment
Bought facilities, equipment
Developed prototypes
Developed technical plans
Developed operational models
Had first sale
Positive cash flow
Dun and Bradstreet credit listing
Unemployment insurance
FICA
Filed federal tax
Hired a lawyer
Consulted a lawyer
Consulted a banker