

THE EFFECT OF ENTREPRENEURIAL TEAM SKILL HETEROGENEITY AND  
FUNCTIONAL DIVERSITY ON NEW VENTURE PERFORMANCE

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ABSTRACT

Using a sample of 88 firms drawn from the inc. 500 list of the fastest growing private firms in America, this research explored the effects of entrepreneurial team skill composition on new venture performance. The study encompassed both a theoretical and an empirical perspective. The results of the research show that team heterogeneity was negatively linked to growth. Further, diversity in academic major in highest earned degree and functional background were negatively linked to revenue. These findings suggest that team heterogeneity is clearly linked to new venture performance, however, diversity limits, rather than enhances, performance.

INTRODUCTION

In a recent article, Gartner, Shaver, Gatewood, & Katz (1994) argue that the "entrepreneur in entrepreneurship" is more likely to be plural than singular. That is, entrepreneurial firms are more likely to be started, by teams of entrepreneurs than individual entrepreneurs. This goes against the belief long held by many researchers in the field of entrepreneurship that most entrepreneurial firms are started by individuals (Gartner, 1988; Carland, Hoy, Boulton & Carland, 1984). Gartner and his colleagues (1994) suggest that viewing entrepreneurship as a collective activity, rather than an individual one, is a new meta-theme that has remained basically unexplored either conceptually or empirically. Moreover, little is known about the effect of

team composition or behaviors on the development of organizational strategy or new venture performance. This study will explore the effects of entrepreneurial team skill composition on new venture performance.

#### HOW DO ENTREPRENEURIAL TEAMS AFFECT NEW VENTURE PERFORMANCE?

Evidence supports the idea that the entrepreneurial event is most often precipitated by a team of entrepreneurs rather than an individual entrepreneur. Kamm, Shuman, Seeger, and Nurick (1990) define entrepreneurial teams as "two or more individuals who jointly establish a firm in which they have a financial interest" (p. 7). Ensley and Banks (1992) and Gartner et al. (1994) extend this definition to include those individuals who have direct influence on strategic choice. For the purposes of this study, an individual who meets these three criteria is considered part of the entrepreneurial team.

Much of the anecdotal evidence on entrepreneurial teams concerns the skills of the team members. Roure and Madique (1986) argue that entrepreneurial teams who have a skill composition that is more diverse make strategic choices that improve new venture performance. Little is known about the specifics of what configurations work best, but the anecdotal work suggests that diverse skills seem to lead to higher new venture performance.

Of the many factors which have been studied in top management teams, two types of team heterogeneity have dominated. The chief focus has been on demographic heterogeneity, defined as demographic differences between team members on characteristics such as national origin, gender, and age (Hambrick, 1993). Top management team skill heterogeneity is also an important topic (Murray, 1989). Skill heterogeneity has been explored qualitatively and anecdotally by entrepreneurship researchers and found to improve new venture performance (i.e., Roure & Madique, 1986).

Murray (1989) attempted to link top management team heterogeneity to organizational performance. He argued that the more heterogenous the skills or functional backgrounds of top management team members; the better the firm's long-term performance will be. He measured skill heterogeneity as the differences in education, major in highest degree, and occupational or functional background among top management team members and he found that team heterogeneity, based on functional area and educational background, was a significant predictor of long-term firm performance. Top management team factors accounted for about twenty-five percent of the variation in short term performance and over fifty percent of the variation in long-term firm performance. Thus, skill heterogeneity should encourage a better set of alternatives to be considered by the team, and each alternative should be considered at greater depth than it might be in a team with more homogenous skills. Considering greater numbers of alternatives should increase the level of cognitive conflict within the team.

Bantel and Jackson (1989) linked skill heterogeneity to innovation in a study that examined innovation in banking. Their sample included top managers from 198 banks in six states. Heterogeneity was operationalized as the coefficient of variation among team members in tenure, age, functional area, educational level, and major field of study in the highest degree. Innovation was measured in a manner similar to Daft's (1978) industry specific measures of innovation. The findings of the Bantel and Jackson (1989) study demonstrated that educational and functional heterogeneity among top management team members positively influenced the number of innovations in banks. They concluded that educational and functional heterogeneity increases a team's cognitive resources and by extension raises the level of cognitive conflict within the team on strategic decisions. They also concluded that increasing these cognitive resources raises the number of innovative alternatives

generated by the group and improves strategic decision making. This finding was tied directly to and extends Murray's (1989) study.

Jackson, Brett, Sessa, Cooper, Julin, and Peyronnin's (1991) study extended the work of Bantel and Jackson (1989) by examining the role of functional and educational heterogeneity on top management team turnover and dysfunctional conflict. They measured team heterogeneity as the coefficient of variation between team member functional area, industry experience, educational level, and academic major in the highest degree just as Bantel and Jackson (1989) and Murray (1989) had earlier. They found that skill heterogeneity was a predictor of top management team turnover rates. A limitation of their study, however, was that they did not attempt to link these team behaviors to organizational performance. Based on these three studies, then, it can be postulated that skill heterogeneity, measured as educational or functional heterogeneity, increases the pool of cognitive resources available to a team (Bantel and Jackson, 1989) and therefore organizational performance (Murray, 1989).

There is a paucity of writings on skill heterogeneity in the entrepreneurship literature. Further, the content is mostly anecdotal. Kamm et al. (1990) offered some evidence as to the importance of teams in new venture performance. In concert with Gartner (1985), they argued that skill diverse teams handle the complexities of new ventures better than skill-homogeneous teams. In a rare empirical study of top management teams in new ventures, Roure and Madique (1986) found that team skill completeness (which is, in essence, team skill heterogeneity) contributed directly to new venture success.

Siegel, Siegel, and MacMillian (1993) studied extremely high-growth new firms in an attempt to identify the characteristics of successful new ventures.

They found that high-growth new ventures tend to be founded by teams. The important findings about teams from the Siegel et al. (1993) study relate to the functional balance of the team, a crude measure of skill heterogeneity. They argued that higher growth firms are better able to support fully developed management teams. At the same time, the statistical relationship can be interpreted two ways. It is not clear from their study whether the fully developed team is a causation for firm growth or whether the growing firm creates enough resources to support the salaries of a fully developed entrepreneurial team.

Finally, Eisenhardt and Schoonhoven (1990) assessed the differences among top managers of entrepreneurial firms in an effort to understand why some firms grow to greatness and why others either die or remain small and become stagnant. They argued that the leader(s) sometimes can and do influence the performance of entrepreneurial firms and that certain individuals or teams have the ability to influence new venture performance when others do not. They found that entrepreneurial teams that have greater skill differences are better able to influence the performance of new ventures than are teams with more similar skills.

#### RESEARCH HYPOTHESES

Taken concurrently the studies described in the previous section establish a clear theoretical basis for a set of hypotheses which speak to the value of entrepreneurial team heterogeneity to new venture performance. In general, theoretical support exists for a link between entrepreneurial team skill heterogeneity and new venture performance. Therefore the following hypotheses are offered:

Hypothesis 1: Entrepreneurial team skill heterogeneity will positively

influence entrepreneurial firm growth.

Hypothesis 2: Entrepreneurial team skill heterogeneity will positively influence entrepreneurial firm profitability.

Hypothesis 3: Entrepreneurial team skill heterogeneity will positively influence entrepreneurial firm revenues.

#### THE SAMPLE

The sample for both phases of the research was the inc. 500, a directory of the nation's 500 fastest growing firms. The inc. 500 had been shown to have a high number of team-driven entrepreneurial firms (Ensley & Banks, 1992). All members of each entrepreneurial team in the inc. 500 received a personalized letter and questionnaire. To be included as an observation in this study, a response had to be received from two or more members of a firm's entrepreneurial team. Single responses were discarded.

#### METHODOLOGY

The data collection phase of this project was based on a survey following Dillman's (1978, p. 181) total design method. A business reply envelope was included with the survey for ease of return. The only response inducement offered respondents was a summary copy of the results. Two weeks after the original mailing of questionnaires a second transmittal letter and an additional survey were mailed to the non-respondents of the sample. Confidentiality of response was guaranteed by the destruction of the surveys after the data were collected from them. Only the team composition was included in the survey. The performance measures were captured using audited data sources. Reliability and validity of the skill scale was checked and is

available from the authors.

#### THE MEASUREMENT OF ENTREPRENEURIAL TEAM SKILL HETEROGENEITY

In the research specific to entrepreneurial teams, no factor was cited as important to firm performance more often than entrepreneurial team skill heterogeneity (Kamm et al., 1990; Roure and Madique, 1986). Gartner (1985) noted that complex ventures require a wide range of skills from the management group. Roure and Madique (1986) implied that the skills and abilities of team members affect firm performance. Yet, skill heterogeneity has seldom been measured in entrepreneurial teams. Furthermore, there was little empirical evidence of the observed relationship between entrepreneurial team skill heterogeneity and cognitive and affective conflict.

The conceptualization and measurement of skills and skill heterogeneity poses special problems for the researcher. These questions encompass: What skills should be included in the discovery effort? How should they be chosen? The Katz (1974) skill typology included three skill categories: technical, human, and conceptual. This typology was extended and used as a scale by Herron (1990), and was used as the measurement scale for the skill heterogeneity construct in this project. Herron (1990) and Katz (1974) provided the rationale for these indicators. In its original form, the Katz skill typology was too broad for practical research use. Herron's (1990) extension of Katz's skill typology narrowed the skills under each category to a manageable level for research purposes. Under technical skills, Szilagyi and Schweiger (1984) suggested a product/service skill category, an organizational skill category, and an industry skill category. Under the human skills category, leadership skills and networking skills were considered most important. Under conceptual skills, separate categories for administrative skill and entrepreneurial skill were provided. Herron (1990) utilized the Szilagyi and Schweiger (1984)

extended skill typology in his model of new venture performance to create the set of scales shown above. Herron's (1990) skill measurement scale had sufficient levels of reliability (reliability coefficient of .76) and validity. Each scale item used a five-point Likert scale ranging from (1) Not Effective, to (5) Extremely Effective. For this research, the standard deviation was used as team-level data points to measure team skill heterogeneity. These variance measures allow for an understanding of the range of skills held by members of a particular entrepreneurial team; the greater the difference in the skills among team members, the higher the coefficient of variation or standard deviation.

A second group of indicators intended to measure team skill heterogeneity were also included in the survey. These indicators included major in college, highest degree, and current functional area of the position now held by the respondent. These indicators came directly from Murray's (1989) work on top management team heterogeneity and firm financial performance. Bantel and Jackson (1989) and Jackson et al. (1991) use similar indicators. There is no previous reliability and validity information available on these measures.

#### MEASUREMENT OF FINANCIAL PERFORMANCE

The five financial performance measures chosen are based on several works (Keats & Hitt, 1988; McGuire, Schneeweis, & Hill, 1986; Schaefer, Kenny, & Bost, 1990). Growth is often cited as an objective of entrepreneurial firms. Sales growth rates for last year and an average sales growth rate over the past five years will be utilized in the analysis. In addition, the growth rate in the number of employees, an often cited side effect of entrepreneurial firms on the economy, will be utilized. In addition the new ventures in this sample were placed into categories of profitability levels but this may not be a meaningful measure of performance in entrepreneurial firms given the growth

objectives of most new ventures. A recent study by Chandler and Hanks (1993) found that the great majority of entrepreneurs have growth concerns that far outweigh their concerns about profitability. Brush and Vanderwerf (1992) found in a review of 34 empirical studies in entrepreneurship that employee and sales growth were the most common variables used. These studies support the use of growth as a measure of new venture performance.

Sources of performance data include Inc. magazine, as well as Dun and Bradstreet's Market Identifiers database. Survey data were not used in order to allow the study to lessen the effects of common method variance and to allow the respondents to concentrate their attention on the entrepreneurial team dynamics variables and dimensions. The questionnaires were coded with an identification number for the purpose of defraying additional mailing costs and to allow results to be matched with appropriate financial information. Confidentiality of the respondents was protected.

#### STATISTICAL ASSESSMENT OF THE HYPOTHESES

The chief statistical tool used for testing the hypotheses was hierarchical regression analysis. Hierarchical regression was an analytic strategy by which variables enter the model depending on their theoretical importance. Ordinary least squares was used to test each of the hierarchical steps. Hierarchical regression was used here for several reasons. First, it had perhaps the most rigorous set of tests of assumptions of any multivariate statistical tool (Belsley, Kuh, and Welsch, 1980). Second, it allowed the researcher to test the influence of several variables at the same time.

In an effort to gather data on teams of entrepreneurs, all of the inc. 500 were utilized as the sample for this study. The inc. 500 is a group of firms which are independently owned and were among the fastest growing firms in the

U.S. The December 1994 list of firms is used in this study. Each of the 1203 officers of these 500 firms received a personalized transmittal letter and individually numbered questionnaire. All questionnaires were coded to reduce mailing costs and to link the response to environmental and performance data. Of the 1203 questionnaires mailed, 322 usable responses were returned. Usable responses were received from 214 firms. Because 56 firms were either out of business or harvested by their entrepreneurs during the time of the study, 167 officers were dropped from the calculation of the response rate. These firms either self-reported that they were purchased, the purchase of the firm was published in *inc.*, or the purchase was a recent posting on the Dun and Bradstreet data base. Given these adjustments, the effective officer response rate was 31.4 percent. The effective firm response rate was 48.2 percent. The effective response rate deducts firms or officers from the total sample that could not respond because they no longer existed, had left the firm, or were no longer at the correct address (Dillman, 1978). This lowered the total sample to 1036 officers and 444 firms.

In order for respondents to be considered a member of the entrepreneurial team, they had to meet at least two of the three following criteria; i.e., they had to be founders, equity stake holders, and/or involved in the strategic decision making of the firm. In total, 88 teams of entrepreneurs and 196 individual entrepreneurs were included in the sample used in the analysis of this study. Teams ranged in size from two to four members. Since the criteria for a respondent to be selected into the team were so important, the criterion variables were used as the basis for a test of non-response bias. A random sample of 50 non-respondents were selected and contacted by phone. Five variables were gathered: team size, how often new strategic plans were developed, involvement in strategic decisions, founder status, and equity status. T-tests on these five variables all yielded non-significant probability values ranging from .39-.84. There was no evidence of non-

response bias.

Approximately 90 percent of the sample were male. The average age of the respondents was 38.4 years. Seventy percent were founders and 74 percent held at least 10 percent of the equity of the firms with which they were involved. Almost 90 percent of the respondents considered themselves entrepreneurs. Only 40 percent had been involved in a new venture previously. Eight percent held high school diplomas, four percent held associates degrees, 50 percent held bachelors degrees, 33 percent held masters degrees, and almost 5 percent held doctoral degrees. Thirty-two percent majored in business, 6 percent in accounting, and 13.2 in engineering. Other majors included english, history, nursing, medical technology, sports management, law, and kinesiology (all of which exceeded five percent of the total of all majors). The firms in this sample grew at an annual average of 1,664 percent over the last five years. The five year sales growth rate range was 524 percent to 11,385 percent. The standard deviation of the five year sales growth rate was 2,065 percent. The industries covered by the sample included a range from SIC code 1521 to 8713. In summary, fifty-five industries were occupied by the 88 firms in this sample. The average age of the firms in this sample at the time of the study was 4.6 years.

#### THE CREATION OF TEAM LEVEL VARIABLES

The method by which the skill scale was collapsed into single variables and the traditional measures of skill heterogeneity were transformed into indices. The Katz (1974) skill scale was used in this study as an attempt to measure skill heterogeneity or skill difference. To create the variable skill heterogeneity, the skills of individual team members were measured first. Individual means on the reduced five item skill scale were then calculated. Team skill heterogeneity was then measured as the standard deviation of the

individual skill scale averages.

The variables of heterogeneity of educational degree, major in highest degree, and functional area were all developed using Blau's categorical index (1977). Blau's (1977) index used the proportion of the team with a certain characteristic, such as a certain major in college, and sums the squared proportions and subtracts the sum from one. This method has been used by Murray (1989) and Bantel and Jackson (1991). The equation for Blau's categorical index was:

$$\text{Blau's Categorical Index} = 1 - \sum (\pi_i^2)$$

where  $\pi_i$  was the proportion of the population in a given group. This calculation resulted in a measure of heterogeneity and its complement was homogeneity.

#### FINDINGS

The outcomes of the hierarchical regression identify a potential link between skill heterogeneity and new venture performance. Tables One, Two, and Three contain the outcomes of three hierarchical regression analyses on each of the three performance measures used in this study. The findings presented in Table One demonstrate a clear link between functional heterogeneity and diversity of major in highest degree. These variables should be considered important because of the significant change in the size of the coefficient of determination. However, note that the signs on the associated regression coefficients were both negative. Overall this model explains about ten percent of the variation in new venture revenues. Additionally, the control variable team size was found not to be significant.

Table One: Two Stage Hiererchial Regression For Revenues

Dependent Variable: Revenues (N=88)

Variables	Model 1	Model 2
Skill Heterogeneity	1230.93	658.07
Team Size	3325.06	7485.60
Degree		450.81
Major		-30742.90**
Function		-21956.41***
R2	0.0052	0.1504
F	0.22	1.93***
Change R2		0.1002*
Change F		-1.71

\*p&lt;.01; \*\*p&lt;.05; \*\*\*p&lt;.10

Table Two presents the findings on sales growth. In this case, entrepreneurial team size, included in this study as a control variable, was found to be an important determinant of new venture growth. Heterogeneity of degree had a negative effect on new venture growth.

Table Two: Two Stage Hierarchical Regression For Sales Growth

Dependent Variable: Sales Growth (N=88)

Variables	Model 1	Model 2
Skill Heterogeneity	-365.82	-374.76
Team Size	1730.39*	1959.93*
Degree		-1881.03**
Major		-275.85
Function		-891.04

R2	0.1769	0.2127
F	9.13*	4.43*
Change R2		-0.0358
Change F		4.70

\*p<.01; \*\*p<.05; \*\*\*p<.10

Table Three presents statistical outcomes that demonstrate no link between team composition and new venture performance. As the table shows, none of the variables were able to predict new venture profitability.

Table Three: Two Stage Hierarchical Regression For Profitability

Dependent Variable: Revenues (N=88)

Variables	Model 1	Model 2
Skill Heterogeneity	-0.16	-0.15
Team Size	-0.21	-0.21
Degree		0.12
Major		-0.76
Function		0.80
R2	0.0144	0.0410
F	0.62	0.70
Change R2		-0.0266
Change F		0.08

\*p<.01; \*\*p<.05; \*\*\*p<.10

#### CONCLUSION

Several conclusions about the effect of entrepreneurial team diversity can be drawn from the findings above. First, entrepreneurial team diversity appears

to have a negative effect on new venture performance. However, team size appears to have a positive influence on new venture growth. The explanation of these findings can be found in literature streams on groups in organizational behavior. Harrison (1993) found that group heterogeneity had a negative effect on group effectiveness. A potential explanation of the findings in this study could be that functional, degree, or major differences in team members cause conflicts and these conflicts lead to problems with implementation of key decisions. Previous organizational behavior research has shown that such diversity in groups can have catastrophic effects on group effectiveness (Harrison, 1993; Hogg, 1987). It is clear from this study that the issues which exist in work groups also exist in entrepreneurial teams. Therefore, the findings of this study fail to support each of the three hypotheses. However, the effect of the composition on new venture performance cannot be denied. These findings suggest that team heterogeneity is clearly linked to new venture performance, however, diversity limits, rather than enhances, performance.

Future research should examine the generation of additional team level variables for testing in entrepreneurial firms. The strategic management literature has a rich history of demographic variables which have been found to affect firm performance (Hambrick, 1993). Future research is needed to clarify demographic diversity and its influence on entrepreneurial team effectiveness and new venture performance.

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