Research note

Do others think you have a viable business idea? Team diversity and judges' evaluation of ideas in a business plan competition

Maw Der Foo[a,*], Poh Kam Wong[a], Andy Ong[b,1]

[a]National University of Singapore Business School, 1 Business Link, Singapore 117592, Singapore
[b]Nanyang Polytechnic, School of Health Sciences, 180 Ang Mo Kio Ave. 8, Singapore 569830, Singapore

Abstract

The study examines how team diversity affects external evaluation of the teams' business ideas. Using an information perspective, we argue that task-related diversity of member characteristics enhance team effectiveness. Nontask diversity hurt team effectiveness by steering teams away from their tasks. Some support was found. Task-related diversity of education level was positively related with evaluation while nontask diversities of age and employment status negatively related with evaluation. The positive relationship of task diversity on evaluations was higher for larger teams. The findings were robust across different functional forms for the demographic factors. Implications of team affects on venture outcomes are discussed.
© 2004 Elsevier Inc. All rights reserved.

Keywords: Team diversity; Early stage team activities; Team outcomes; External evaluation

1. Executive summary

One of the key issues faced by entrepreneurs is to convince potential resource providers of a business idea's viability. In this study, we examine how diversity of team member

---

* Corrresponding author. Tel.: +65-6874-6886; fax: +65-6775-5571.
E-mail addresses: mawder@nus.edu.sg (Maw Der Foo), Andy_Ong@nyp.gov.sg (A. Ong).
[1] Tel.: +65-6550-1421.

characteristics influences external evaluation of the team's business idea. The popular image of the lone entrepreneur notwithstanding, high-growth ventures are usually built around a team. The popular and entrepreneurship literatures also suggest the formation of diverse teams because members bring with them experiences and knowledge of technical and management knowledge to collectively work on a business idea. Unfortunately, we know little about the early phases of teams engaged in new venture activities and how diversity affects team outcomes. Instead, what we know of new ventures are from studies of teams after the venture has successfully formed.

Drawing from extant research on work teams, we show that diversity in characteristics, such as educational background, is positively related to external evaluation of the team's business idea. We argue that this diversity type leads to diversity in perspectives and information that is beneficial for the team. In contrast, diversity in characteristics, such as age and employment status, is negatively related to external evaluations of the team's ideas. We argue that these diversity types lead to differences in values, attitudes and interests of a nontask nature that hurt team outcomes. The critical distinction is that diversity related to task factors is beneficial for the team while diversity in nontask factors leads to worse outcomes.

Empirically, we study teams participating in a business plan competition organized by a university in Singapore. Competitions of this nature help promote entrepreneurship by providing an avenue where individuals with ideas and those involved with start-ups (e.g., business angels, venture capitalists, serial entrepreneurs and professionals, such as bankers, lawyers and accountants) can network to discover, develop and exploit business ideas (Huffman and Quigley, 2002). We focus on external evaluation of the teams' ideas in assessing team outcomes. This is because business ideas are by themselves plentiful; unless the team's idea is positively evaluated, it might not be able to attract funding or obtain access to potential suppliers and customers.

Although not without some variation, our findings support the benefits of task-related diversity and costs of nontask diversity on team outcomes. The positive relationship of task-related diversity with external evaluations is greater for larger teams as compared to smaller ones. Extending the findings, we believe that universities are in a unique position to assist teams involved in start-up activities plug into a network of contacts, so as to attract and select members of diverse backgrounds. In forming the team, members should be cognizant of the mixed affects diversity has on outcomes. They should actively seek members with task-related differences but with similarity in nontask characteristics. For example, individuals with diversity in education backgrounds but with similarity in attitudes, values and interests.

Overall, however, the findings show that diversity accounts for only 21% (or 12% using adjusted R^2) of the variation in external evaluations. Although the variation is not as high as we had expected, we caution that entrepreneurs should not neglect diversity. Given the high failure rates of new ventures, any advantage that a venture gets, albeit small, should not be neglected. We further caution that the findings should be extended only to teams in the early stages of new venture activities. At later stages of development, it is not certain whether task diversity has positive or negative effects on outcomes. We speculate that teams with nontask diversity would overcome differences over time as members learn to work with one another. The challenge is to prevent the team from disbanding before this occurs.

2. Introduction

Entrepreneurship is the process through which in the absence of a market for future goods and services, these goods and services come to be in existence (Shane and Venkataraman, 2000). The prior literature contends that the nexus of opportunities and enterprising individuals is the distinctive contribution that entrepreneurship research makes (Shane and Venkataraman, 2000). The alert individual packages a business idea that forms the basis for future business ventures. While the intrinsic quality of ideas is important, we focus on external evaluation of these ideas. Ideas are plentiful (Hills and Shrader, 1998) and unless an idea gets external support, it is difficult to commercialize it. Favorable external support is crucial in high-growth businesses as entrepreneurs require extensive resources, including capital, equipment, space and information (Birley, 1986; Jarillo, 1989). But convincing parties outside the venture of a business idea's merits is difficult; given the low success rate for new ventures, there must be something really compelling before external stakeholders are convinced of the idea's viability as a business venture. This paper focuses on the team that packages the idea. Despite the popular image of the lone entrepreneur, successful high-growth firms are usually built around a team (Cooper and Daily, 1997). Team-founded firms have higher success rates (Chandler and Hanks, 1998) than firms started by single-founders over a range of performance measures (Roberts, 1991).

Although one person may get insights into an idea, that individual must attract a team to flesh it out. Team members bring with them information, experiences, as well as technical and management knowledge. Diversity of member backgrounds is emphasized because diversity brings with it a range of skills and views which presumably leads to superior venture performance (Ucbasaran et al., 2003). However, little is known about how diversity affects venture outcomes and studies on these relationships should be done (e.g., Cooper and Daily, 1997). We use the literature on team diversity, in particular task and nontask diversities, and explore how diversity affects external evaluation. Consistent with this literature, we posit that task diversity benefits the team (as measured by external evaluations) by increasing the level of task-related information in the team; nontask diversity hurts team outcomes by distracting members' time, efforts and energies into nontask issues.

Our empirical effort contributes in several ways. First, we provide insights into the factors that shape evaluation at early stages of venture activities. While early factors affect future venture outcomes, little is known about this phase because ventures are usually identified after the firms have successfully started (Aldrich, 1999). In particular, the study extends the work of opportunity evaluation by focusing on the enterprising team instead of the enterprising individual. We propose that team diversity influences evaluations through quality of the idea developed and the articulation of that idea.

Second, the study highlights several areas where diversity effects are different from extant literature. We show that age diversity is related to evaluation, a view not shared by some researchers (e.g., Williams and O'Reilly, 1998). We also show that employment status diversity is related to evaluation, something that has not been demonstrated. The overall finding that diversity accounted for 21% (or 12% using adjusted R^2) also implies that diversity in the entrepreneurship literature could be overemphasized. Third, universities play an important role

in encouraging entrepreneurship (Di Gregorio and Shane, 2003) and the empirical efforts of studying a business plan competition team adds to this work. The study also responds to the call for more research on the effects of diversity on venture outcomes (Cooper and Daily, 1997).

3. Hypotheses development

Team effectiveness (outcomes) in this study is defined as external evaluation (judges of the competition) of the team's business idea. We expect that team characteristics shape external evaluation through quality of the plan and quality of the idea. Although there could be differences between the actual quality and experts' rating, Shepherd et al. (2003) found that experience in the venture industry up to 15 years predicts greater accuracy in rating business ideas. This is despite the fact that experienced persons (VCs in the studies of Shepherd et al.) can be overconfident, overuse heuristics (Zacharakis and Shepherd, 2001), and seldom utilize potentially beneficial decision aids (Shepherd and Zacharakis, 2002).

The most obvious team factor that influences team effectiveness is that of team size. Larger teams have potentially more information resources (West and Anderson, 1996) and Eisenhardt and Schoonhoven (1990) found that team size was positively related to higher sales growth. Campion et al. (1996) found that larger clerical worker teams were more effective and Roberts (1991) reported that the number of founders positively predicted entrepreneurial effectiveness over a wide range of performance measures. However, larger teams face process losses, such as coordination costs (West and Anderson, 1996) and communication difficulties (Smith et al., 1994). Despite the possibility of curvilinear effects, we expect size to positively predict external evaluations for new venture teams. Entrepreneurial teams tend to be small, with four or less founding members (e.g., Roberts, 1991). For example, Roberts's (1991) study of university laboratory spin-offs found a median of two founding members while studies by Chandler and Hanks (1998) found an average of four founding members. Within the range of team sizes for entrepreneurial teams, it is reasonable to assume positive instead of curvilinear effects (see for instance, Boyd, 1990 where sizes of up to 9 is positively related with team outcomes).[2]

H1: Larger teams receive higher external evaluation of the team's business idea.

3.1. Task-related diversity

Larger teams do not always increase the amount of information in the team. Members with similar experiences may not bring in new skills and knowledge. In contrast, diversity brings

---

[2] West and Anderson (1996) concluded that size effects are curvilinear. Very small groups draw from an inadequate information base while large groups may be too complex for effective decision making (Boyd, 1990). We did not model curvilinear effects because the team sizes in this study were small and less than the 9 or 12 members (e.g., Boyd, 1990) where size could have negative effects. Additional analyses not reported in this study showed that as expected, size squared did not relate with external evaluations. These additional analyses are available from the authors upon request.

about knowledge of alternatives (Pelled et al., 1999) which increases the team's information base. Yet, reviews have found mixed results of diversity on effectiveness (Williams and O'Reilly, 1998). Diversity while increasing the amount of information available to the team makes it difficult for members to work with one another. Individuals with diverse backgrounds may see the world differently, leading to disagreements in the team (Pelled et al., 1999). For instance, Chatman and Flynn (2001) found that members of diverse teams were less cooperative with each other, especially in the early stages of team development. Pelled et al. (1999) explained that diversity of member characteristics can either be task or nontask related. Task-related diversity captures experiences relevant to the team's task, including that of education, work function and company tenure (e.g., Simons et al., 1999). Nontask-related diversities capture experiences that may not relate to the team's task, including that of gender, race (e.g., Chatman and Flynn, 2001) and age (e.g., O'Reilly et al., 1989). Task diversity benefits the team in several ways. Most directly, it increases the knowledge available to the team. These diversities allow a greater variety of perspectives that promote innovative problem solving (Milliken and Martins, 1996).

Less directly, diversity, while leading to less informal communication (Smith et al., 1994), leads to increased task communication as each member knows that he or she has something unique to bring to the team's task. This promotes discussion of options, reduces groupthink, and allows members to synthesize complex ideas rapidly (Zenger and Lawrence, 1989). Debate among task-diverse teams benefits the team as it increases decision comprehensiveness, defined as the extent decisions made are exhaustive and integrative (Simons et al., 1999). Debate is particularly important in situations characterized by change and uncertainty (Eisenhardt, 1989). Overall, task diversity enables a team to develop better ideas by going into issues more deeply and developing a more complete understanding of problems and alternative solutions (Pelled et al., 1999).

Education is a task-related characteristic that shapes the knowledge an individual brings to a task and the perspective taken by that individual (Tsui et al., 1995). For instance, individuals trained in business might focus on consumer reactions to a product while individuals trained in engineering focus on technical specifications. Both skill sets are beneficial to conceptualizing and presenting the business idea to external evaluators. Less obviously, education level attained is another task-related factor (Pelled, 1996). Typically, higher education levels focus on conceptual skills while lower levels on practical skills. An individual with a degree can focus on engineering design while the individual with a diploma can focus on the repair and maintenance of machines. Both skills are needed to develop good business ideas. There are few studies on how education level influences team effectiveness. Indirect evidence is provided by Laughlin et al. (1969) who found that groups comprising a mix of high (H), medium (M) and low (L) ability performed better than teams with every member of the same ability level. While education level is not the same as ability level, both variables capture skill and knowledge in a particular domain (Pelled, 1996). In summary, we hypothesize that:

H2a: Diversity of education background is positively associated with external evaluation of the team's business idea.

H2b: Diversity of education level is positively associated with external evaluation of the team's business idea.

3.2. Nontask-related diversity

Nontask diversity triggers conflict of a nontask nature which distracts the team's energy and resources, thereby hurting team outcomes (Williams and O'Reilly, 1998). In the early stages of a team's development, physiological attributes of age and gender are salient as they are easily observable (Tsui et al., 1995). These attributes influence the experiences a person goes through. Zenger and Lawrence (1989) illustrated that individuals in college during the Vietnam War years share experiences of social upheavals during this period. Individuals of different age groups also have different interests and priorities. These characteristics are low in task relatedness because they do not reflect diversities in task perspectives and skills (Pelled, 1996). Instead, they promote interpersonal conflict, a conflict type that brings with it anger, frustration and negative affect. Conflict restricts cognitive functioning due to the stress and anxiety produced (Jehn and Mannix, 2001). Diversity hurts the team's ability to develop its idea because the suspicion and hostility generated can cause members to lose perspective, and work less well with one another (Amason and Sapienza, 1997). Although communication difficulties diminish over time as members learn to work with one another (Chatman and Flynn, 2001), the team might disband before it can work through these differences (Williams and O'Reilly, 1998). Moreover, given the scarcity of resources in teams engaged in new venture activities, they can ill afford the time and energy needed to work through these differences. It is therefore not surprising that initial conditions predict new venture outcomes (Cooper et al., 1994).

Employment status diversity is another nontask-related diversity that negatively affects team outcomes. With the growing trend of universities becoming hotbeds of entrepreneurship (Di Gregorio and Shane, 2003; Huffman and Quigley, 2002), there is some interest among students in starting new businesses. These students sometimes invite individuals with work experience to bolster team experience. This is prudent as it in brings in more industry and task-related experiences to the team.[3] Unfortunately, the effect of including these individuals on team outcomes is not known. Similar to other types of nontask-related diversity, we expect employment status diversity to have negative affects. Employment status diversity could result in differences in lifestyles and interests. Individuals who are working have greater financial resources to explore a wider range of interests and may also engage in activities to keep up with their peers. We could not find previous studies of how this diversity shapes team outcomes. Studies

---

[3] Teams with members possessing work experience are likely to be more effective. For instance, Shepherd et al. (2003) found that for relatively inexperienced venture capitalists (VCs), increasing experience predicted greater accuracy in evaluating business proposals. This study controls for the benefits of work experience on team outcomes by considering the proportion of members with work experience. Diversity of employment status, in contrast, possibly shapes differences among the lifestyles and interests of members in full-time employment and those not in full-time employment.

on age diversity show that differences in lifestyles and outlook (O'Reilly et al., 1989; Williams and O'Reilly, 1998) hinder the team's ability to pull together members' inputs which hurts team outcomes. In summary, we hypothesize that:

H3a: Age diversity is negatively associated with external evaluation of the team's business idea.

H3b: Gender diversity is negatively associated with external evaluation of the team's business idea.

H3c: Employment status diversity is negatively associated with external evaluation of the team's business idea.

Finally, we turn to the mediating affects of size on task-related diversity. Teams with task-related diversity should receive positive evaluations due to the skills and information available to the team. The benefit of diverse teams is the greater information available. However, a large team may not benefit from the information advantages if it is not able to integrate the information available to develop better ideas or to better elaborate these ideas. Larger teams may find it harder than smaller teams to coordinate their activities (West and Anderson, 1996) because size is related to more interpersonal differences among team members (Amason and Sapienza, 1997). All things being equal, a team with more members will encompass a greater number of divergent feelings, views and personal goals (Amason and Sapienza, 1997). These differences can hurt team cohesion and hinder effective communication among team members. The net effect is that larger teams are less capable of integrating a large amount of information. Thus, the benefits of task-related diversity is less for larger teams than for smaller teams.

H4a: The positive relationship between diversity of education background and external evaluation of the team's business idea is greater for smaller teams than for larger teams.

H4b: The positive relationship between diversity of education level and external evaluation of the team's business idea is greater for smaller teams than for larger teams.

4. Research method

4.1. Sample and procedures

The participants of the study are participants of a business plan competition organized by a university in Singapore. The competition's goal was to promote high-technology entrepreneurship and participation was open to anyone in Singapore. Several government agencies helped to publicize the competition, as it was consistent with Singapore's efforts to promote entrepreneurship. Teams were not told what high technology meant but they were encouraged to participate if they thought their ideas had high growth potential. They were informed that a viable business idea should present a compelling opportunity that considered markets and

customers, as well as a business model that would enable them to achieve success. The judges looked for ideas that could achieve growth rather than mere profitability. Potentially profitable businesses with low returns were unlikely to receive high ratings.

The competition attracted 154 teams and each submitted a three- to five-page description of their business idea. It should be noted that the teams submitted executive summaries of a business plan, not a full business plan that investors, such as venture capitalists, would expect. Consistent with the competition's focus, the participants tended towards business ideas with high growth potential and tended to exclude the "corner-store type" ventures. Participating teams should not have received external funding. This sample tended towards teams at the idea conception and planning stage rather than teams in advanced stages of the entrepreneurial journey. Half the participants were full-time students with the other half holding full-time jobs. A third of the full-time students were postgraduates who had some full-time work experience.

Drawing our sample from a business plan competition has several advantages. First, these competitions allow us to identify teams engaged in the early stages of entrepreneurial activities. The early stages are particularly important because they shape future outcomes (e.g., Eisenhardt and Schoonhoven, 1990). Early activities unfortunately are difficult to identify and track.[4] Second, a competition of this nature is a way for students, those from industry and potential investors to network with one another (Huffman and Quigley, 2002), yet factors that shape outcomes for these teams are not known. Third, many of the competition's judges are gatekeepers of resources. They include experienced entrepreneurs, business angels, bankers and venture capitalists. Convincing gatekeepers of the viability of an idea is an important step to secure resources, including capital, access to potential suppliers, advice and mentorship (Birley, 1986).

4.2. Independent variables

As part of the competition's requirement, members had to submit their personal particulars. From these, we calculated the following indices that were used as predictors:

4.2.1. Team size

This was defined as the number of individuals listed in the team's entry and ranged from 2 to 9 members (mean = 3.54, S.D. = 1.52). The sample was positively skewed (skewness of 1.10) and standard error of .20 ($z = 5.5$, $P < .01$). This means that team sizes were bunched up at the lower end of the range and violated the normality assumption. We used a natural log transformation, one of the transformations recommended by Tabachnick and Fidell (2001). After transformation, the positive skew dropped to .32 with standard error of .20 ($z = 1.60$, n.s.).

4.2.2. Diversity of education background

Seven majors were represented, namely, computer science (21%), engineering (31%), science (3%), business (19%), economics (2%), accounting (4%) and others (20%). Diversity

---

[4] There are now efforts to track early entrepreneurial activities, such as the Global Entrepreneurship Monitor project coordinated by Babson College and London Business School.

of education background was measured with the Herfindal–Hirschman index. This index is often used to measure diversity of categorical variables (e.g., Hambrick et al., 1996). The formula is:

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

where H is the diversity measure and p is the proportion of team members in each category. The higher the H, the higher the diversity in the team. A score of 0 means that all team members had the same major.

4.2.3. Diversity of education level

This was measured using the coefficient of variation, the most common index for measuring the distribution of continuous variables (e.g., Tsui et al., 1995). The coefficient of variation is preferred to the standard deviation because it is scale invariant and reflects relative rather than absolute differences (Allison, 1978).

The education level was converted to a continuous scale with (1) others, (2) diploma, (3) higher diploma, (4) bachelor, (5) master and (6) doctoral degree. For this sample, (1) was for individuals who had the equivalent of high-school education. For points (2) to (6), an individual was placed in that education category if the individual was pursuing or had attained that education level. Coefficient of variation was obtained by dividing the standard deviation of education level in the team by the team's mean education level. The higher the score, the higher the education level diversity in the team. A score of 0 indicated perfect homogeneity.

4.2.4. Diversity of age

This was also measured with the coefficient of variation where each team's standard deviation of age was divided by the team's mean age, measured in years.

4.2.5. Diversity of gender

This was measured using the Herfindal–Hirschman index.

4.2.6. Diversity of employment status

Participants reported whether they were working or full-time students. The Herfindal–Hirschman index was used to calculate the diversity level.

4.3. Dependent variable

4.3.1. External evaluation of the business idea

The dependent variable was judges' evaluation of the teams' business ideas. One hundred and thirty-one judges were selected based on their experience in evaluating business plans and involvement in new venture activities. They included professional investors, business founders, private investors, legal professionals involved with start-up companies and patent experts. It was the organizer's strategy to invite a large number of people to rate the plans so that each judge evaluated only a few plans and could devote more attention to each plan. All

the judges used the same rating form and were asked to rate the plans as if they were real start-ups seeking funding. It should also be noted that the judges were not told of how large each team was.

The evaluation criteria were developed by the organizers, taking into consideration issues of interest to investors in Singapore and the written comments of judges from previous competitions. Each team was rated by two judges on a five-point Likert scale from 1 (*poor*) to 5 (*better*). The items for the scale (Cronbach α of .84) were "define the customer", "say who pays for the product or service", "describe the product or service" and "differentiate from competitors". Although developed in Singapore, the criteria were consistent with that used by venture capitalists in the United States to rate business ideas (e.g., Stevenson et al., 1994). The judges' ratings were positively correlated 96% of the time. Interrater reliabilities computed as intraclass correlation coefficient is .76, above the cutoff of .70 (Shrout and Fleiss, 1979). External evaluation of each team's idea was calculated by adding the scores of the two judges on the four criteria and dividing this by 8. Thus, the minimum possible external evaluation score was 1 and the maximum 5.

4.4. Industry controls

We controlled for industry because different business segments are characterized by varying levels of difficulty of entry and intensity of competition. For the competition entry, teams stated the industry associated with their ideas. The industries represented were sciences (life, materials and physical) 5%, services (professional and others) 19%, computer hardware and software 15%, consumer products 7%, e-commerce 40% and others 14%.

5. Results

Hierarchical regressions were used to test Hypotheses 1 to 4. Model 1 tested if the mean age of members,% of members of a particular gender,% of members who were working, mean education level of team members and number of majors represented in the team related with evaluations. Model 2 included the diversity measures of education background, education level, age diversity, gender diversity and employment status. Model 3 added moderating effects of team size on task-related diversity. Model 4 tested findings robustness to alternative functional forms for team characteristics. The industry controls were excluded in the regressions because preliminary analysis showed that they did not relate with external evaluations.

Almost 66% of the teams had members with full-time work experience. Average age of team members was 27.5. Consistent with research in entrepreneurship, females, with 18%, formed the minority. The average team size was 3.5, again consistent with research on new venture teams. The average number of majors represented in each team was 2.1. The average external evaluation was 2.9 out of a five-point scale. The means, standard deviations, reliabilities and intercorrelations of the study and control variables are presented in Table 1. We reviewed the correlations among the predictors and none exceeded .6 where multi-

Table 1
Pearson's correlations, means and standard deviations

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
(1) External evaluation	2.92	0.68	1.00																
(2) Ind—sciences	0.05	0.22	−.06	1.00															
(3) Ind—services	0.19	0.39	−.04	−.11	1.00														
(4) Ind—computer hard and software	0.15	0.36	−.01	−.10	−.20*	1.00													
(5) Ind—consumer products	0.07	0.26	−.04	−.06	−.13	−.12	1.00												
(6) Ind—e-commerce	0.40	0.49	.05	−.19*	−.40**	−.34**	−.23*	1.00											
(7) Ind—others	0.14	0.34	.06	−.09	−.19*	−.17*	−.11	−.33**	1.00										
(8) Size	3.54	1.52	.11	.12	.02	−.08	.02	.02	−.06	1.00									
(9) Education background diversity	0.36	0.27	−.02	−.05	.08	−.10	−.02	.04	.00	.26*	1.00								
(10) Education level diversity	0.09	0.12	.12	.10	.01	−.06	−.03	−.03	−.03	.05	.02	1.00							
(11) Age diversity	0.10	0.11	−.15†	.06	−.05	.06	−.07	−.02	.04	.17*	.15†	.24*	1.00						
(12) Gender diversity	0.25	0.27	.07	.14†	−.09	.03	−.07	.02	−.01	.05	.16†	.04	.21*	1.00					
(13) Employment status diversity	0.19	0.27	−.14†	.20*	−.01	.02	−.02	−.02	−.09	.19*	.05	.18*	.17*	.38**	1.00				
(14) No. majors in team	2.12	0.93	.08	.00	.10	−.11	−.04	.02	.01	.42**	.85**	.11	.14†	.19*	.08	1.00			
(15) Mean education of team	4.19	0.66	.03	.07	−.05	.05	−.09	.00	.03	.02	−.10	−.18*	.01	.10	.25*	−.09	1.00		
(16) Mean age of team	27.45	5.67	−.08	.20*	.00	−.05	.10	−.18*	.10	−.08	.11	.03	.18*	.18*	.04	.08	.39**	1.00	
(17) Proportion of females	0.18	0.22	.10	−.03	−.02	.03	−.02	−.04	.08	−.06	.14†	.11	.21*	.58**	−.16†	.12	−.09	.00	1.00
(18) Proportion with work experience	0.66	0.39	.10	.00	−.03	−.08	.06	−.01	.09	−.22*	.11	.28*	.17†	−.06	−.26*	.07	.10	.45*	.10

$N = 154$ teams.

† $P < .10$, two-tailed.

*$P < .05$, two-tailed.

**$P < .01$, two-tailed.

Table 2
Hierarchical regression analysis of team diversity on ratings of entrepreneurial idea

	Model 1 β	Model 2 β	Model 3 β	Model 4 β
Mean levels				
Size—natural log	.19†	.19†	.22*	.23*
No. majors in team	− .01	.16	− .06	− .02
Mean education of team	.10	.17	.13	.17
Mean age of team	− .20†	− .21†	− .18	− .18
Proportion of females	.08	− .10	− .12	− .11
Proportion with work experience	.23*	.16	.12	.13
Independent variables				
Education type diversity		− .19	.02	− .04
Education level diversity		.21*	.21*	.08
Age diversity		− .15	− .16†	− .15
Gender diversity		.24	.25	.23
Employment status diversity		− .29*	− .28*	− .28*
Interaction of size and diversity				
Size × Education type diversity			.22*	.24*
Size × Education level diversity			− .07	− .05
Squared diversity				
Education type squared				.17
Education level squared				− .05
Model F statistics	1.64	2.25*	2.35**	2.11*
R^2	.07	.17	.21	.22
Adjusted R^2	.03	.10	.12	.11
ΔR^2	.07	.10*	.04†	.01

$N = 154$ teams.
† $P < .10$, two-tailed.
*$P < .05$, two-tailed.
**$P < .01$, two-tailed.

collinearity might pose a problem. To calculate the interaction effects of size and diversity, the size and diversity variables were first centralized. This is to reduce multicollinearity among the variables and their interaction terms (Aiken and West, 1991).

The regression analyses are shown in Table 2. Model 1 was not significant ($F = 1.64$, n.s.). Adding diversity variables in Model 2, increased R^2 significantly ($\Delta R^2 = .10$, $P < .05$). Supporting Hypothesis 1, size ($\beta = .19$, $P < .10$)[5] was positively related with evaluation. No support was found for Hypothesis 2a that education background diversity is related with

---

[5] Because directional hypotheses were presented, one-way tests are suitable (Pelled et al., 1999). Using a one-way test, the correlations of employment status diversity and age diversity with the outcome variable (external evaluation) were both significant at $P < .05$. Size was significantly correlated with external evaluation at $P = .06$ and education level diversity at $P < .10$. The actual correlations are probably larger than that reported in the correlation table because there cannot be perfect agreement among the judges' ratings. The effect of differences in ratings is to attenuate the effect size (Hunter and Schmidt, 1990). To be conservative, we used two-tailed tests.

evaluation ($\beta = -.19$, n.s.). Hypothesis 2b that diversity of education levels is positively related with external evaluation was supported ($\beta=.21$, $P<.05$). No support was found for Hypotheses 3a and 3b that age ($\beta = -.15$, n.s.) and gender diversities ($\beta=.24$, n.s.) negatively predicted external evaluation. Hypothesis 3c that employment status diversity is negatively related with external evaluation was supported ($\beta = -.29$, $P<.05$). Model 3 significant at $P<.01$ added the interaction of size with education background and size with education level diversities. The change in R^2 from Model 2 to Model 3 was .04 ($P<.10$) and the variables that were significant in Model 2 remained significant. Age diversity was marginally significant ($\beta = -.16$, $P<.10$).

Contradicting Hypothesis 4a, the interaction of size and education background diversity had a positive coefficient ($\beta=.22$, $P<.05$). This was contrary to Hypothesis 4a that the positive relationship between diversity of education background and evaluation is greater for smaller teams than for larger teams. There was no support for Hypothesis 4b that the positive relationship between diversity of education level external evaluation of the team's business idea is greater for smaller teams than for larger teams. While Model 4 was significant at .05, the R^2 change was not significant. Therefore, we did not interpret the coefficients in this model.

6. Discussion

The venture community has increasingly used business plan competitions to identify new teams, ideas and technologies. As Huffman and Quigley (2002) noted, these competitions encourage entrepreneurial activity and links entrepreneurs to funding sources. The competitions, often based in a university, become the nexus through which teams with business ideas can network with potential resource gatekeepers that can assist them in developing their business ventures. We explore how diversity relates with team outcomes as determined by external evaluation of the teams' business ideas. The study therefore examines the popular belief that diversity is important in venture teams (e.g., Ucbasaran et al., 2003) and responds to the call for more research on diversity effects on venture outcomes (Cooper and Daily, 1997).

The findings showed that task diversity was related to higher evaluations while nontask diversity was related to lower evaluations. Diversity added about 10% to the explanation of external evaluations. The effects of these diversities have not been studied in a new venture context (Cooper and Daily, 1997). Moreover, we showed that employment status diversities and education level diversities also relate with team outcomes in this context. To our knowledge, these diversities have not been studied in this literature. We also showed that the positive relationship of size on positive evaluations was higher for larger teams than for smaller teams. The diversity interactions explained an additional 4% over the diversity variables.

As expected, size was one of the more important variables. However, Model 3 showed that the coefficients of employment status diversity was larger than that of size and the coefficients of education level and age diversities were also close to that of size. We did a

Usefulness Analysis which showed that size explained an additional 4% of the variance over and above that of the diversity variables. The diversity variables explained an additional 11% over and above that of size. The effect of size on evaluations was less strong than the effects of the diversity variables on evaluations. The overall finding was that the best model (Model 3) in this study explained only 21% of the variance of external evaluations. This explanatory level suggests that the importance of diversity (e.g., Ucbasaran et al., 2003) could be overemphasized in the new venture literature—at least at the business idea stage of venture development. On the other hand, we caution that teams should not neglect composition as diversity still has some effects on evaluations. Because most ventures fail (e.g., Shane and Foo, 1999) and possibly many venture ideas do not even result in new businesses, every benefit that teams get should not be neglected.

The premise of this paper is that information is embodied within the team such that the collective experiences of members influence external evaluation of the team's idea. At the most basic level, team size is a proxy for experiences and larger teams have better outcomes—defined as external evaluation by judges in this study—than smaller teams. Consistent with arguments that diversity brings with it greater views and skills that lead to better venture performance (Ucbasaran et al., 2003), we hypothesize that diversity of team characteristics shapes team outcomes. Teams benefit from task differences as these differences direct the team's attention towards task issues. In contrast, nontask differences hurt team outcomes as they direct the team's attention away from its task. As expected, size was positively related to external evaluations while age and employment status diversities were negatively related to external evaluations. The main effect of education level diversity had a positive relationship with external evaluation when the moderating effect of team size was not taken into consideration.

Contrary to expectations, larger teams were associated with better evaluations when there was education background diversity. Our expectation was based on the assumption that conflicts inherent in larger teams (Amason and Sapienza, 1997) hinder the team's ability to combine members' skills. A reason for the finding is that the teams in this study can select their own members. Conceivably, members select those that they work well with and size has less effect on members' ability to combine their differing views. However, this does not explain why larger sized teams benefit from more education background diversity. A possibility is that larger teams with more diversity have at their disposal more education backgrounds to draw from. For instance, a diverse team with two members has at the most two education backgrounds to draw from while a team with four members could potentially draw from four education backgrounds.

However, the explanation that members only select those that they can work with contradicts the finding that age and employment status diversities negatively affect outcomes. Perhaps, some teams that comprise students select older persons or working individuals to bolster team quality. Thus, the individual's ability receives more weight than the ability to work with this individual. This finding is worrying. Business plan competitions often encourage the formation of teams with diverse characteristics and a benefit of these competitions is to provide opportunities for individuals with diverse backgrounds to network with one another. In particular, teams comprising young, less experienced individuals need to

include older, presumably wiser, individuals. However, the findings show that this is related with lower evaluations of the team's idea. Special care should be taken if that individual has a wide age gap with other team members or has a different employment status. Some of the communication difficulties will dissipate over time as members learn to work with one another (Watson et al., 1993). The challenge is to ensure that differences do not cause the team to dissolve before this occurs.

Gender diversity however, did not relate with external evaluations. In this study, most teams were male dominated. Thus, a homogeneous team was one that had mostly males (possibly all males) while a heterogeneous could also be male dominated. Perhaps the female members gave in to the male members rather than let conflicts escalate. Studies have shown that females value cooperation more than males and exhibit more cooperative behaviors (Walters et al., 1998). In female-dominated groups, males could conceivably be less willing to give in to the dominant coalition, leading to interpersonal conflicts in the group.

Extending the study to university-based entrepreneurship in general, the role of universities in the idea elaboration phase is particularly crucial. Through services provided by universities, such as business plan competitions, incubators within universities and transfer of university technologies to potential entrepreneurs, teams have the opportunity to quickly ramp up their initial idea into a viable business opportunity. In particular, the networking opportunities provided by the university enable teams to include in the venture people of different characteristics. Ideally, members should have task-related diversities but similarity in nontask-related areas. In this way, teams benefit by getting a wide range of skills, information and resources, without the corresponding interpersonal difficulties that come with diversity. Furthermore, the benefit of task diversity is greater in larger teams. Therefore, teams should be encouraged to build larger sized teams, at least larger than the two to four members found in a typical new venture team.

6.1. Limitations and future work

A limitation of this study is that it examined teams at the idea evaluation phase. Possibly all diversity types, including task-related diversity, are detrimental at the exploitation phase as differences make it difficult for members to work towards a common goal and to integrate their activities. A rival conjecture is that task-related diversity is more important at the exploitation phase. At the evaluation phase, the skill demands on a team are low. For example, a team that has no member trained in accounting can do basic revenue projections but this team will find it difficult to establish a full-scale accounting system when the venture develops. Future studies can examine how diversity effects are influenced by the phase of team development. Future work can also track teams to examine if early success predicts later success. Another limitation was that half the participants were full-time students and the competition's aim was to promote high-technology entrepreneurship. Care must be made when extrapolating the study to venture teams in general, and especially to teams not in technological areas.

Future studies can also examine if the judging criteria developed in Singapore is appropriate for other countries. In this study, external evaluations were judges' perception

of the business idea. Future studies can determine if better external evaluation was in fact due to the quality and elaboration of the business. For instance, studies can use methods adopted by Shepherd and colleagues (e.g., Shepherd et al., 2003), where start-up outcomes of business failure or success were known. A limitation of their method, however, was that the nature of the business and the firm name can influence rater evaluation. Collectively, this study together with studies using others methods will enable us to understand factors that shape venture outcomes.

Finally, the context should be taken into consideration. In the competition, evaluators do not have much knowledge about the team and this limits diversity's influence on outcomes. In a venture capital setting for instance, knowledge about team composition can shape perceptions of the team. Studies should be done in other settings to test the generalizability of the findings. Despite this limitation, business plan competitions are useful settings as potential investors use this opportunity to find and fund new ventures (Huffman and Quigley, 2002).

Acknowledgements

References

Aiken, L.S., West, S.G., 1991. Multiple Regression: Testing and Interpreting Interactions Sage, Newbury Park, CA.

Aldrich, H., 1999. Organizations Evolving Sage, London.

Allison, P.D., 1978. Measures of inequality. Am. Sociol. Rev. 43 (6), 865–880.

Amason, A.C., Sapienza, H., 1997. The effects of top management team size and interaction norms on cognitive and affective conflict. J. Manage. 23 (4), 495–516.

Birley, S., 1986. The role of networks in the entrepreneurial process. J. Bus. Venturing 1 (1), 107–111.

Boyd, B., 1990. Corporate links and organizational environment: a test of the resource dependence model. Strateg. Manage. J. 11 (6), 419–430.

Campion, M.A., Papper, E.M., Medsker, G.J., 1996. Relations between work team characteristics and effectiveness: a replication and extension. Pers. Psychol. 49 (2), 429–451.

Chandler, G.N., Hanks, S.H., 1998. An investigation of new venture teams in emerging businesses. In: Reynolds, P.D., Bygrave, W.B., Carter, N.M., Manigart, S., Mason, C.M., Meyer, G.D., Shaver, K.G. (Eds.), Frontiers of Entrepreneurship Research. Babson College, Babson Park, MA, pp. 318–330.

Chatman, J.A., Flynn, F.J., 2001. The influence of demographic heterogeneity on the emergence and consequences of cooperative norms in work teams. Acad. Manage. J. 44 (5), 956–974.

Cooper, A.C., Daily, C.M., 1997. Entrepreneurial teams. In: Sexton, D.L., Smilor, R.W. (Eds.), Entrepreneurship 2000. Upstart Publishing, Chicago, IL, pp. 127–150.

Cooper, A.C., Gimeno-Gascon, F.J., Woo, C.Y., 1994. Initial human and financial capital as predictors of new venture performance. J. Bus. Venturing 9 (5), 371–395.

Di Gregorio, D., Shane, S.A., 2003. Why do some universities generate more start-ups than others? Res. Policy 32 (2), 209–227.

Eisenhardt, K.M., 1989. Making fast strategic decisions in high-velocity environments. Acad. Manage. J. 32 (3), 543–576.

Eisenhardt, K.M., Schoonhoven, C.B., 1990. Organizational growth: linking founding team, strategy, environment, and growth among US semiconductor ventures, 1978–1988. Adm. Sci. Q. 35 (3), 504–529.

Hambrick, D.C., Cho, T.S., Chen, M., 1996. The influence of top management team heterogeneity on firms' competitive moves. Adm. Sci. Q. 41 (4), 659–684.

Hills, G.E., Shrader, R.C., 1998. Successful entrepreneurs' insights into opportunity recognition. In: Reynolds, P.D., Bygrave, W.B., Carter, N.M., Manigart, S., Mason, C.M., Meyer, G.D., Shaver, K.G. (Eds.), Frontiers of Entrepreneurship Research. Babson College, Babson Park, MA, pp. 30–43.

Huffman, D., Quigley, J.M., 2002. The role of university in attracting high tech entrepreneurship: a Silicon Valley tale. Ann. Reg. Sci. 36 (3), 403–419.

Hunter, J.E., Schmidt, F.L., 1990. Methods of Meta-Analysis: Correcting Error and Bias in Research Findings. Sage Publications, Newbury Park, CA.

Jarillo, J.C., 1989. Entrepreneurship and growth: the strategic use of external resources. J. Bus. Venturing 4 (2), 133–147.

Jehn, K.A., Mannix, E.A., 2001. The dynamic nature of conflict: a longitudinal study of intragroup conflict and group performance. Acad. Manage. J. 44 (2), 238–251.

Laughlin, P.R., Branch, L.G., Johnson, H.H., 1969. Individual versus triadic performance on a unidimensional complementary task as a function of initial ability level. J. Pers. Soc. Psychol. 12 (2), 144–150.

Milliken, F.J., Martins, L.L., 1996. Searching for common threads: understanding the multiple effects of diversity in organizational groups. Acad. Manage. Rev. 21 (2), 402–433.

O'Reilly, C.A., Caldwell, D.F., Barnett, W.P., 1989. Work group demography, social integration and turnover. Adm. Sci. Q. 34 (1), 21–37.

Pelled, L.H., 1996. Demographic diversity, conflict and workgroup outcomes: an intervening process theory. Organ. Sci. 7 (6), 615–631.

Pelled, L.H., Eisenhardt, K.M., Xin, K.R., 1999. Exploring the black box: an analysis of work group diversity, conflict, and performance. Adm. Sci. Q. 44 (1), 1–28.

Roberts, E.B., 1991. Entrepreneurs in High Technology: Lessons from MIT and Beyond Oxford Univ. Press, New York, NY.

Shane, S.A., Foo, M.D., 1999. New firm survival: institutional explanations for new franchisor mortality. Manage. Sci. 45 (2), 142–159.

Shane, S.A., Venkataraman, S., 2000. The promise of entrepreneurship as a field of research. Acad. Manage. Rev. 25 (1), 217–226.

Shepherd, D.A., Zacharakis, A.L., 2002. Venture capitalists' expertise. A call for research into decision aids and cognitive feedback. J. Bus. Venturing 17 (1), 1–20.

Shepherd, D.A., Zacharakis, A.L., Baron, R.A., 2003. VCs' decision processes: evidence suggesting more experience may not always be better. J. Bus. Venturing 18 (3), 381–401.

Shrout, P.E., Fleiss, J.L., 1979. Intraclass correlations: uses in assessing rater reliability. Psychol. Bull. 86 (2), 420–428.

Simons, T., Pelled, L.H., Smith, K.A., 1999. Making use of differences: diversity, debate, and decision comprehensiveness in top management teams. Acad. Manage. J. 42 (6), 662–673.

Smith, K.G., Smith, K.A., Olian, J.D., Sims, H.P., O'Bannon, D.P., Scully, J.A., 1994. Top management team demography and process: the role of social integration and communication. Adm. Sci. Q. 39 (3), 412–438.

Stevenson, H.H., Roberts, M.J., Grousbeck, H.I., 1994. New Business Ventures and the Entrepreneur, 4th ed. Irwin, Burr Ridge, IL.

Tabachnick, B.G., Fidell, L.S., 2001. Using Multivariate Statistics, 4th ed. Allyn and Bacon, Needham Heights, MA.

Tsui, A.S., Egan, T.D., Xin, K.R., 1995. Diversity in organizations: lessons from demography research. In: Chemers, M., Oskamp, S., Costanzo, M. (Eds.), Diversity in Organizations: New Perspectives for a Changing Workplace. Sage Publications, Thousand Oaks, CA, pp. 191–219.

Ucbasaran, D., Lockett, A., Wright, M., Westhead, P., 2003. Entrepreneurial founder teams: factors associated with member entry & exit. Entrep. Theory Pract. 28 (2), 107–127.

Walters, A.E., Stuhlmacher, A.F., Meyer, L.L., 1998. Gender and negotiator competitiveness: a meta-analysis. Org. Behav. Human Decis. Process. 76 (1), 1–29.

Watson, W.E., Kumar, K., Michaelsen, L.K., 1993. Cultural diversity's impact on interaction process and performance: comparing homogeneous and diverse task groups. Acad. Manage. J. 36 (3), 590–602.

West, M.A., Anderson, N.R., 1996. Innovation in top management teams. J. Appl. Psychol. 81 (6), 680–693.

Williams, K.Y., O'Reilly, C.A., 1998. Demography and diversity in organizations. In: Staw, B., Sutton, R. (Eds.), Research in Organizational Behavior, vol. 20, pp. 77–140.

Zacharakis, A.L., Shepherd, D.A., 2001. The nature of information and overconfidence on venture capitalists' decision making. J. Bus. Venturing 16 (4), 311–333.

Zenger, T.R., Lawrence, B.S., 1989. Organizational demography: the differential effects of age and tenure distributions on technical communication. Acad. Manage. J. 32 (2), 353–376.