

Business Planning in Entrepreneurial Teams: An Information Processing Perspective

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Abstract

In this paper we invoke a teamwork as information processing framework to hypothesize how a business plan can improve the performance of entrepreneurial teams, in particular teams that are diverse. We test these hypotheses on a longitudinal sample of close to 400 entrepreneurial teams surveyed multiple times over several years. We find that both having a business plan and revising that business plan during the startup process enhance team performance but that neither influences firm performance. Further, we find that educationally diverse teams benefit more from the business plan revision because it enhances informational benefits while reducing informational challenges imposed by diversity. This research advances the literature on business planning as well as the literature on entrepreneurial teams.

Keywords:

Business plan; Business plan revision; Entrepreneurial team; Team diversity; Information processing

1. Introduction

As new ventures are being launched, entrepreneurial teams operate under high levels of uncertainty (McMullen & Shepherd, 2006). Intended products, markets and business models often change during the formative stages of development as new information becomes available and is processed by the team. Consequently, many aspects of teamwork change, such as goals and targets, the roles of team members, and the actual work tasks to be carried out (Chandler et al., 2005). Important aspects of teamwork need to be reassessed and re-negotiated among team members in the process, increasing the need for team interaction and information exchange (Gibson, 2001). In short, an entrepreneurial team's capacity for information processing is of the essence (Galbraith, 1977; van Knippenberg et al., 2004).

A business plan can potentially assist such information processing. The business plan requires the team to gather information from members, collectively discuss required tasks, decide on strategies and identify missing information (Delmar and Shane, 2003). This provides a platform for team members to communicate with each other, discuss different information and integrate their perspectives. If teams are diverse, with members possessing different types of knowledge and information, a business plan may be of particular importance and value. Diverse teams have a wide range of information available for problem solving (Horwitz and Horwitz, 2007) but also generate conflicts and obstacles (Horwitz and Horwitz, 2007) that may disrupt the use of that informational pool. For a diverse team to perform, it is thus essential that mechanisms are in place that allows information elaboration (van Knippenberg et al., 2004). The business plan can potentially serve as such a mechanism of information elaboration, ensuring that informational benefits of diversity materialize while simultaneously reducing the negative effects of diversity (e.g., information

overload, debate and conflict) by soliciting contribution and keeping team members focusing on the overarching goals.

The pros and cons of business planning have been extensively debated in the entrepreneurship literature (Delmar, 2015a, 2015b; Honig and Samuelsson, 2014). Prior studies have viewed a business plan through the lens of rational planning (see Brinckmann et al., 2010 for an extensive review) or as a symbolic activity in response to coercive and mimetic institutional forces, which set the expectations that new ventures write business plans (Honig and Karlsson, 2004). In this paper, we instead propose that business planning can be productively conceptualized within an information processing framework. By viewing business planning through this lens, it is possible to provide a richer understanding of how and when it influences performance. In carrying out this research, we make the following contribution to the literature.

First, by viewing business planning as an information elaboration platform, we place it within the wider context of teamwork, rather than as an activity separate from and on equal footing with other startup activities. Information processing theory (e.g, Gibson, 2001; Hinsz et al., 1997) offers causal mechanisms through which business planning translates into performance (or not). Specifically, we argue, business planning is effective to the extent that it helps assign roles and functions to team members and to coordinate work so as to improve team performance. Thus, we hypothesize and find that business planning influences entrepreneurial team performance in terms of the number of activities completed to move the venture forward.

Second, this theory helps develop hypotheses and provides explanations as to why the performance implications of business planning vary across different teams. We hypothesize, and find, that business planning provides greater performance benefits in diverse than in homogenous teams. Thus, our research helps explain the mixed results in prior research (Delmar, 2015a, 2015b;

Honig and Samuelsson, 2014) regarding the relationship between the business plan and performance. As such, we provide a new theoretical lens for scholars to examine the role of business planning.

Third, we also contribute to the literature on entrepreneurial teams. A recent review concluded that we need to move beyond assuming direct relationships between team characteristics and performance (Klotz et al., 2014). We heed that call and examine how business planning and team diversity interact in explaining new venture performance. Thus, we refine and expand models of team diversity and outcomes. To our knowledge, this is the first attempt trying to open the “black box” between entrepreneurial team diversity and performance adopting an information processing view. By doing so, we are able to delineate how the business plan can reduce the challenges of diverse teams.

Fourth, business planning appears to be a highly relevant mechanism of information elaboration specific to the new venture context, having received virtually no attention in the teams literature. Previous studies have examined factors that can enhance team information elaboration such as team member goal orientation (Pieterse et al., 2013), task motivation (van Knippenberg et al., 2004) and shared task representations (van Ginkel and van Knippenberg, 2008). While these are important, we believe that in the new venture context, business planning may potentially be the most salient information elaboration mechanism. It is because business plan does not only ensures informational benefits of elaboration, but also reduces certain informational drawbacks that stands in the way of elaboration. Thus, our study also serves to test the boundary conditions of the information elaboration perspective and extends it into the new venture context.

The paper continues as follows. First we introduce entrepreneurial teamwork as information processing aimed at effective information elaboration. Then we discuss the role of the

business plan as information elaboration mechanism. After that we delineate challenges for heterogeneous teams with respect to information elaboration and examines the role of business plan as to how it relates to those challenges. Finally an empirical analysis and a conclusion will be presented.

2. Theory and Hypotheses

2.1. Entrepreneurial Teamwork as Information Processing

Teams can be viewed as information processors that attend to, encode, store, receive and process information and knowledge (Hinsz et al., 1997). Just like individuals, teams process relevant and available information to perform cognitive tasks including problem solving, judgment, and decision making (Gibson, 2001; Hinz et al, 1997). According to Gibson (2001), it is useful to view information processing as a set of four integrated phases or stages: *information accumulation, interaction, examination and accommodation*.

Information *accumulation* refers to the initial stage of teamwork, where team members acquire, perceive and store relevant information for problem solving (Gibson, 2001). At this stage, teams gather information for use. The amount and range of relevant and non-redundant information accumulated by or available to a team is an important prerequisite for reaching high-quality decisions (Edwards, 1954; Dahlin et al., 2005). Information *interaction* is the second stage where team members retrieve, exchange and structure information through communication and interaction with each other (Gibson, 2001). During this stage, team members retrieve (or surface) knowledge about other team members and form a transactive memory system, i.e., through repeated interaction and communication team members figure out who knows what (Gibson, 2001; Wegner, 1987). The next stage of teamwork is information *examination*. During this stage, team members work together to negotiate, interpret, and evaluate information at hand (Gibson, 2001).

Information *accommodation* is the final stage during which “group members’ perceptions, judgments and opinions are integrated and then generate decisions and actions” (Gibson, 2001, p.126).

Appropriate processes at each stage are important in order to reach high quality decision (Dahlin et al, 2005). At the same time, it is difficult to assess the quality or performance of teamwork, in particular in the entrepreneurial context where there is high uncertainty regarding what are appropriate actions or processes. Therefore, the degree to which teamwork results in accurate and comprehensive representation of available information can serve as a relevant proxy for eventual team performance (Stasser and Titus, 1987). Information elaboration can be viewed as a direct determinant of team decision quality and performance (Resick et al., 2014; van Knippenberg et al., 2004). It involves “the exchange of information and perspectives, the process of feeding back the results of this individual-level processing into the group, and discussion and integration of its implications” (van Knippenberg et al., 2004, p.1011). Teamwork can therefore be viewed as aimed at information elaboration, the degree of which will be influenced by various team processes and objectives (van Kippenberg et al., 2004).

Effective entrepreneurial team process involves five aspects or dimensions. Montoya-Weiss et al. (2001) and Dahlin et al. (2005) propose that range, depth and integration of information use represent three important dimensions of effective teamwork. We propose that in addition, the amount and efficiency of information use are important in the entrepreneurial context. Amount of information use is important because confidence increases as the amount of relevant information increases (Oskamp 1965; Zacharakis and Shepherd, 2001). Although accuracy may not necessarily improve with increases in information (Castellan 1977), more information has a positive influence on decision makers’ confidence in their decisions (Zacharakis and Shepherd,

2001). This increased confidence could be particularly important in the entrepreneurial context because the high uncertainty of entrepreneurship often leads to hesitancy and procrastination (McMullen and Shepherd, 2006). The efficiency of information use refers to how efficiently firms utilize their pools of information to inform their decision and action under situations of high time pressure and fleeting opportunities. Entrepreneurial tasks are carried out under time pressure (Baron, 1998), leaving insufficient time for elaborate decision making. In order to capture fleeting opportunities entrepreneurial teams need high decision speed (Forbes, 2005) and the ability to rapidly transit from dealing with one issue to another (Eisenhardt, 1989). However, successful decision making under such circumstances still requires consideration of extensive information and multiple alternative courses of action (Bourgeois and Eisenhardt, 1988; Eisenhardt, 1989). Thus, the efficiency of information used implies the extent to which firms are able to make fast decision and at the same time consider the relevant issues regarding the decision under high uncertainty and time pressure of the entrepreneurial context. We now turn to an analysis of the four phases of entrepreneurial teamwork assessed along the five dimensions of effectiveness.

2.2. Information Processing Challenges for Entrepreneurial Teams

Entrepreneurial teams face unique challenges in the team process. First, there are challenges when teams accumulate their information. With homophily driving team formation (Ruef et al., 2003), members likely possess similar information and knowledge, leading to excessive information overlap. Moreover, people are more likely to contribute shared information to enhance the impression of competence and credibility (Wittenbaum et al., 1999). Entrepreneurial teams may be especially susceptible to focus on common information because that act under uncertainty and complexity requires extensive information or large information load (Baron, 1998), which often leads team members to focus on shared information to reduce

ambiguity (Lu et al., 2012). In particular when performance targets are unclear or have no demonstrably correct answer, as in entrepreneurial teams, team members are less likely to draw on their unique unshared information (Brodbeck et al., 2007; Stasser and Stewart, 1992). These challenges reduce information range, potentially leading to weaker problem solving ability (Jackson et al., 1995).

Teams can also suffer from free riding and shirking when teams accumulate their information. Because entrepreneurial team members are residual claimants, freeriding may not be expected (Jensen and Meckling, 1976). However, in an entrepreneurial team it is hard to monitor and evaluate individual effort or contribution because tasks and responsibilities are ambiguous, not clearly defined, overlap and change (Backes-Gellner et al., 2006; Hoogendoorn et al., 2012). As residual claimants, each entrepreneurial team member typically only receives a part of value created by any additional effort that is proportional to the number of team members (Kandel and Lazear, 1992). Given the large amount of work that entrepreneurs typically carry out, this creates incentives for freeriding and shirking, reducing the amount of information available for use.

An effective transactive memory system is required to effectively retrieve information (Gibson, 2001) in information interaction. When team roles are ambiguous, unnecessary time will be spent on retrieving, exchanging and structuring knowledge from the accumulated informational pool. Many entrepreneurial teams do not assign explicit roles to team members and roles change over time (Aldrich, 1999; Stinchcombe, 1965). Such role ambiguity could reduce adaptability and induce decision making by consensus, reducing speed and increasing the cost of decision making (Sine et al., 2006).

During information examination, normative influences can lead to an emphasis of dominant perspectives and overlook minority ideas. Under normative influence, individuals who

dissent from the dominant position held in the group tend to conform because they are motivated by the desire to please others, to gain social approval, or to avoid others' rejection (Brodbeck et al., 2007). This reduce the depth of information examination because dominant perspectives are accepted at face value without being critically evaluated for its pros and cons. Individuals can also show a bias towards information that fit their initial preferences when they examine information (Brodbeck et al., 2007). This also affects the depth of information examined because team members focus on preferences rather than critically assessing all aspects of the information at hand. Brodbeck et al. (2007) and Stasser and Stewart (1992) argued that normative influence is particularly common when decision making is judgmental, which applies to entrepreneurial decision making (Baron, 1998).

Further, conflict can lead to ineffective information examination. Cognitive conflict is usually viewed as positive in the team literature (e.g., Williams and O' Reily, 1998). However, conflict leads to increased time spent on examination activities such as negotiating, interpreting, and evaluating information and difficulties switching from one task to the next (Gibson, 2001). Capturing fleeting opportunities requires quick decision speed (Forbes, 2005) and smooth transitioning from one issue to another (Eisenhardt, 1989). Entrepreneurial activities are carried out under time pressure (Baron, 1988). Thus, effective conflict resolution and balancing deliberation with efficiency are challenging for entrepreneurial teams (Lechler, 2001).

2.3. The Business Plan as an Information Elaboration Mechanism

The challenges identified in the entrepreneurial team process suggest that it may be important for these teams to have mechanisms in place to assist information elaboration. We propose that business planning can provide such a mechanism. To the best of our knowledge, business planning has not before been examined through the lens of information elaboration. A

business plan is a written document that describes the current state and the presupposed future of an organization (Honig and Karlsson, 2004). The process of writing a business plan includes collecting and analyzing information and then using that information to guide the business plan and action (Castrogovanni, 1996). Although the pros and cons of business plan has been extensively debated, there are some ways in which it can potentially contribute to the team process.

Studies of the actual content of business plans suggests that they contain several distinct parts. For example, a book of how to write the business plan by Abrams (2003) found that new venture business plans typically consisted of 14 sections including objective setting; environmental analysis; SWOT analysis; financial projections; and so on. That suggests that to some extent, a business plan can facilitate that the entrepreneurial team accumulates information of sufficient range, which is otherwise a challenge. Planning also stimulates information collection and intraorganizational communications and interactions (Powell, 1982). It requires extensive informational inputs from different areas of expertise in order to provide a systematic analysis of the firm and its environment (e.g., Gruber, 2007; Matthews and Scott, 1995). Thus, writing a business plan could motivate the team to repeatedly gather information from members, collectively discuss required tasks, decide on strategies and identify missing information (Delmar and Shane, 2003). This suggests that the business plan can also assist in information interaction and examination.

The preparation of a business plan can also increase team reflexivity defined as “the extent to which team members overtly reflect upon the group’s objectives, strategies, and processes” (West, 1996, p.559). The writing of a business plan calls for team members to consider the major tasks of venture creation, identify missing information (Delmar and Shane, 2003; Foo et al., 2005) and systematically analyze the evidence for and against different alternatives (Kuratko, 2014). This

requires team members to pause and reflect upon the past, the present and the future, increasing reflexivity. Reflexivity induces team members to identify their own unique information and its implication for success (van Ginkel et al., 2009). Thus, the business plan could reduce the tendency to focus on shared and preference-consistent information.

Role ambiguity is a challenge for entrepreneurial teams that potentially stifles information interaction. Business plans typically contain a section that explicates roles and functions of team members (Kuratko, 2014; Mason and Stark, 2004). Such explicit role assignment can help clarify roles and functions reducing the need for repeatedly retrieving, exchanging and structuring information (Gibson, 2001). It could also reduce the tendency toward focusing on shared rather than unique information. A clear role signals expertise, which increases the confidence to provide unique information associated with the particular role assigned rather than seeking approval from mutual enhancement or social validation (Brodbeck et al., 2007; Stasser et al., 1995). Empirical studies show that mutual awareness and recognition of team members' expertise facilitates utilization of more unique information (Stasser et al., 1995).

Business plans typically include quantified objectives and measureable benchmarks for comparing forecasts with actual result (Block & MacMillan, 1985; Kuratko, 2014). It also sets up the specific steps needed for the achievement of certain goals (Delmar and Shane, 2003). As such, it provides mechanisms for monitoring progress. Combined with clarification of roles and responsibilities, this generates greater opportunities to monitor the contributions of individual team members, which reduces the risks of freeriding and shirking. Alternatively, it clearly reveals who contribute to the team or not, which can lead to the exit of those team members who don't contribute to the startup process (Chandler et al., 2005).

Taken together, these arguments of the potential role of the business plan to increase information elaboration throughout the team process lead to the following hypothesis:

Hypothesis 1: Entrepreneurial teams with a business plan outperform entrepreneurial teams without a business plan

The role of the business plan in new venture development has been controversial. New ventures have limited time, money and other resources to spare. Therefore, some argue that the time and effort spent on preparing a business plan are largely wasted because things don't turn out as expected in the plan and new ventures are better off spending their efforts on performing the actual startup activities (see Brinckmann et al., 2010 for a review of these arguments). In addition, some authors argue that those firms that actually write business plans do so as a response to external pressures from various constituents, such as providers of funding, and rarely use them in the actual venture creation process (Karlsson and Honig, 2009). Thus, business planning could mainly be a response to normative institutional pressures (Honig, 2004) as a means of increasing legitimacy and securing finances (Delmar and Shane, 2003). While this may be the case, there is extensive evidence that some businesses indeed actively engage in business planning and use business plans as an important vehicle to move the new venture forward (Bracker et al., 1988; Delmar and Shane, 2003; Liao & Gartner, 2006). Thus, there is likely great variance in the extent to which businesses write business plans and the extent to which they use them. Given that new ventures operate under uncertainty, it is difficult to make reliable forecasts of suitable actions and outcomes (Sarasvathy, 2001). New ventures need to adapt and change during the launching process (Gruber, 2007). Therefore, the value of the business plan as initially conceived as an information elaboration platform is likely to diminish throughout the startup process. As more information becomes available during the startup process, uncertainty is reduced, and the requirements of the

entrepreneurial teams clarifies. As a result, initial assumptions likely become less accurate and useful. This suggests that a business plan needs to be updated, revised and adapted to new realities in order to function as an effective information elaboration mechanism. Honig (2004), for example, advocates the use of contingency-based business planning including constant adaptation of the plan to fit the changing environment. Revisions to the business plan throughout the startup process would be indicative of firms actively engaging in business planning. It would seem that such an ongoing planning process would enhance the information processing of the team and thus contribute to information elaboration. On the basis of this, we are able to pose our second hypothesis:

Hypothesis 2: Entrepreneurial teams that revise their business plan during the startup process outperform teams that don't.

2.4 Team Diversity and Business Planning

The literature highlights that team diversity can influence information elaboration (Homan et al., 2007; van Knippenberg et al., 2004). Diversity implies that team members are different along important dimensions, which reduces information overlap. Because of differences in information, stocks of knowledge, and social networks diverse teams can access a broader range of information and absorb more varied information (Dahlin et al., 2005). This helps generate more alternative ideas and solutions to encountered problems (Certo et al., 2006). However, while ensuring the accumulation of information of greater range, it also generates challenges for information interaction. Entrepreneurial team diversity is associated with greater probability of cognitive conflicts (Klotz et al., 2014). Although cognitive conflict may have beneficial consequences in terms of generating information of greater depth (Klotz et al., 2014), information interaction is facilitated by similarity among team members (Barnlund and Harland, 1963) and greater cognitive

conflict can slow down the interaction process making it less efficient (Gibson, 2001). Cognitive conflict as associated with diverse teams can also engender emotional conflicts (Amason and Sapienza, 1997; Lechler, 2001), and reduce the willingness to communicate with each other. As such, diversity can negatively affect interaction.

Less information overlap brought by diversity also leads to lower probability of initial consensus, which can reduce normative influence and stimulate team members to express dissenting views (Nemeth, 1986). Such dissent is associated with intensive debate, thus facilitating the exchange of more unique and preference-inconsistent information (Schulz-Hardt et al., 2006). It engenders divergent thinking and therefore promotes greater consideration of unique and preference-inconsistent perspectives, which leads to information examination of greater depth (Brodbeck et al., 2002).

Finally, accommodating information to final decision and action requires integration of different perspectives (Gibson, 2001), to which logical links are made between items of information (see Bower and Hilgard, 1981). Integration of ideas and perspectives need common conceptual grounds to understand and learn the logical links between them (Dahlin et al., 2005; West, 2007). When ideas or perspectives becomes diverse, it would be hard to find a consistent and coherent logic to link them together (Dahlin et al., 2005). As a result, diversity can negatively influence information accommodation.

Thus, it would seem that diversity is a double-edged sword that enhances part of the team process, while simultaneously making other parts of the team process more difficult. Diverse teams have access to more diverse information, knowledge and perspectives, which could increase problem solving ability, creativity, improving performance (Foo et al., 2006; Pieterse et al., 2013). However, it also generates conflicts and inconsistencies that cannot easily be resolved and thus

reduce efficiency and integration of teamwork. It would seem that a business plan could serve to enhance some of the advantages of diversity while also alleviating some of the disadvantages. For example, it could be difficult to fully utilize the diverse information provided by a diverse entrepreneurial team unless mechanisms are in place that collect, structure, and explicate such information. The business plan can serve as such a mechanism to leverage the information range of diverse teams. Moreover, the business plan is a vehicle for information interaction. Both in the writing and the implementation of the plan, team members need to repeatedly agree on analyses, conclusions, and action plans. Diversity in perspectives increases discussion and cognitive conflicts among team members, which benefit deeper examination of information at hand (Ensley et al., 2002; Pelled et al., 1999). However, this also leads to more time spent on examination and discussion (Gibson, 2001). Entrepreneurial tasks are usually performed under high time pressure (Baron, 1998; Eisenhardt, 1989), leaving insufficient time for extensive examination of all issues. Such time pressure leaves diverse teams with the dilemma of discussing some issues in depth while dismissing others. By outlining clear goals and milestones (Delmar and Shane, 2003; Foo et al., 2005), the business plan can help diverse teams keep the bigger picture in mind, sorting out which issues need more elaboration and which can be handled quicker. It also presents a focus on immediate conflicts and disagreements. Thereby, the business plan can help overcome the inefficient interactions and integrative difficulty associated with diverse teams, and leverage the diversity of perspectives and viewpoints. Taken together, this suggests that the performance advantages we hypothesized for teams that have a business plan should be amplified for teams that are more diverse. This leads to the following formal hypothesis:

Hypothesis 3: The greater the diversity, the more teams benefit from a business plan.

By extension, the same logic should also apply to the advantages of revising the business plans during the startup process. Diverse teams should benefit more from such revisions. This suggests the following hypothesis:

Hypothesis 4: The greater the diversity, the more teams benefit from revising their business plan.

3. Data and Methods

3.1. Research Design and Sample

In order to test our hypotheses, we relied on data from the Panel Study of Entrepreneurial Dynamics II (PSED II). PSED II started in 2005 with the selection of 1214 nascent entrepreneurs based on screening a representative sample of 31,845 American adults and collected data in six annual waves. Thus, PSED II is a representative sample of entrepreneurs trying to start businesses in the USA. The sampling procedure and data collection approach have been described in detail elsewhere (Reynolds and Curtin, 2008). These data have some notable strengths related to studying entrepreneurial team performance. First, team challenges when trying to start a business are likely different than those of operating the new venture once started. There is greater uncertainty related to tasks and roles, which need to be constantly renegotiated. This should make the performance implications of business planning and diversity more salient. Second, PSED II avoids the survival bias of studying established new ventures because many teams disband their efforts before the business is started (e.g., Davidsson and Gordon, 2012). For example, in our study 49% of the ventures were disbanded *before* they are up and running and it is possible to control for such attrition. Third, PSED II collects annual data over a 6-year period, and has detailed information on 34 types of venture organizing activities (Reynolds and Curtin, 2008). This practice allows for the

real-time study of the startup process as it unfolds reducing the risk of hindsight bias and memory decay.

In order to qualify for inclusion in our sample as nascent entrepreneurial teams, respondents had to meet a number of criteria during the first interview: Two or more individuals were classified as official owners of the venture, none of them working on behalf of an organization; they had performed some activity towards starting the business over the past 12 months but the firm was not yet operational and their first start-up activities occurred less than 10 years ago; the startup had not progressed to the point where it would be considered an operating business. We also excluded 22 entrepreneurial teams consisting of 6 or more members because PSED II collected detailed information about a maximum of 5 individuals. These screening processes led to 537 teams available for analysis. Cases that lacked information about our dependent or independent variables were also dropped. In total, this led to a sample of 396 entrepreneurial teams that were actively trying to start a business during the first wave of PSED II in 2005, and subsequently reported information about their progress.

We used a key informant approach (Reynolds and Curtin, 2008), with a person actively involved in the startup responding on behalf of the whole team. Given that our variables concern biographical data such as the age, gender, education, and previous experience of the team members, as well as the progress of the venture, there should be little concern for bias.

This paper is chiefly concerned with team and firm performance. In the nascent entrepreneurship context, this is best captured in terms of studying the progress towards the goal of establishing a profitable business. Therefore, we study: (a) the team's success at moving the venture forward by completing organizing activities; and (b) the time it takes from initiating the

first activity towards starting the business until the first month in which all expenses and salaries were covered by revenue for more than 6 months, if that ever occurs.

3.2. Variables

Dependent variables

The goals of new ventures vary and therefore it is difficult to identify suitable performance targets for entrepreneurial teams that operate existing businesses. For example, research suggests that maximizing profits or growth is not necessarily a goal of independent businesses (e.g., Wiklund et al., 2003). However, the competition of organizing activities to establish a profitable business, are necessary criteria for any entrepreneurial team. We therefore rely on two aspects of performance – team performance and firm performance. Consistent with the teams literature (Devine and Philips, 2001) we measured *Team Performance* in terms of the number of organizing activities completed by the team. This is a relatively direct and proximal outcome of a team striving to move a venture towards a working business. Further, it is not directly influenced by external factors such as overall economic climate, actions of competitors or customer preferences. It is therefore an adequate measure of how well the team functions together and is able to move the new venture forward. It was measured by the summation of 34 predefined organizing behaviors defined in PSED II (Reynolds and Curtin, 2008) such as establishing supplier credits, registering legal form of business, etc..¹ During each interview round, respondents were asked which of the 34 activities they had performed and the dates each activity was completed. We coded each organizing activity ‘1’ in the month of completion and ‘0’ otherwise.

In addition, we measured *Firm Performance*, which captures the market success of the nascent venture. Following previous studies of nascent firms (e.g., Davidsson and Gordon, 2012;

¹ Because the preparation of a business plan is our independent variable, we didn't include it when we calculated the team performance (number of organizing activities completed).

Gartner and Liao, 2012; Lichtenstein et al., 2007), we operationalized this in terms of the length of time it takes from completing the first organizing activity until it generates positive cash flow for more than 6 of the past 12 months. This is arguable a better measure of the market success of an emerging venture than profits or sales (Samuelsson and Davidsson, 2009). If a firm had not reached positive cash flow during the last interview, it was coded as right-censored at this time. Similarly, if the nascent venture has been abandoned, it was coded as right-censored the month the disengagement occurred. In our final sample, 83 ventures (21%) achieved positive cash flow.

Independent Variables

Business Plan. Different operationalization for business plan has been proposed. For example, Delmar and Shane (2003) measured both a dichotomous measure of business plan completion and a hierarchical measure of business planning. Because we are interested the function of the business plan as an information elaboration mechanism instead of a planning tool, we are concerned more about whether teams had a business plan at place than about whether they completed it. Thus, following Liao and Gartner (2008), we measure business plan as whether teams had a business plan during the study period. Specifically, PSED II asked respondents the question “Has a business plan been prepared for this startup?” in each wave of data collection. We code “0” for those teams that have no business plan at all from wave A to wave F and code it “1” for those teams that had a business plan during the study period, no matter they prepared it in the first wave or prepared it in later waves. 318 ventures (80%) were coded 1 while 78 ventures (20 %) were coded 0.

Business Plan Revision. In each wave, PSED II asked respondents about whether they modified their business plan since last interview. We code this variable “0” for teams that did not modify their business plan in any wave (161 teams) or did not have a business plan at all (78 teams)

and code it “1” for those teams that modified their business plan at least once during all waves. 157 (40 %) ventures were coded 1 while 239 ventures (60 %) were coded 0.

Team Diversity is argued to influence new venture performance (Klotz et al., 2014). Diversity in terms of functional, educational, or experiences and perspectives is relevant to the tasks performed by teams. As such, this type of diversity is likely to be more closely related to task related informational processes and performance. Other diversity attributes such as age, gender, and race are not as closely connected to the actual tasks performed by the team and thus likely to have a weaker connection to team performance (for a discussion of more or less task-related diversity see e.g., Webber and Donahue, 2001). Moreover, the theoretical perspective we apply (i.e., information and decision making perspective) focuses on work tasks, whereas the social categorization perspective (Tajfel et al., 1971) is more concerned with easily observable bio-demographic attributes such as gender, age and ethnicity. While demographic diversity can bring different backgrounds and cultures, it does not necessarily engender diversity of perspectives or ideas (Chowdhury, 2005). Therefore, in this study we focus on the interaction between task-related diversity and the business plan, while controlling for bio-demographic diversity of age, sex and race.

Further, as suggested by Klotz et al. (2014), rather than aggregating multiple dimensions of diversity into an index, we rely on separate diversity dimensions. Specifically, we examine *education level diversity* (Foo et al., 2005; Pelled, 1996), *functional diversity* (different primary occupations) (Beckman et al., 2007; Ensley et al., 1998), and *experience diversity* (general work experience) (Horwitz & Horwitz, 2007). Educational attainment was measured in 8 categories ranging from eighth grade to Ph.D. Functional diversity refers to the different 3-Digit 2000

Occupation Codes (OCC) of each team member as reported by the respondent. Finally, experience measures number of years of prior work experience regardless of industry or occupation.

Although heterogeneity can be measured in a number of ways, heterogeneity of the categorical variables was calculated using Blau's index (1977) calculated as: $1 - \sum P_i^2$. Where p is the proportion or percent of team members in a category and i is the number of different categories represented in the team. We used this for computing sex diversity, race diversity, education level diversity and functional diversity. Blau's index has been cited as reliable and consistent with other acceptable indices of heterogeneity (Bantel and Jackson, 1989).

In terms of continuous diversity variables, we use the coefficient of variation. This concerns age diversity and experience diversity. The coefficient of variation converts the standard deviation to a value that can be compared between two number sets of different magnitudes. Using the coefficient of variation is consistent with previous literature (e.g., Amason et al., 2006; Foo et al., 2005). All these diversity measures were collected during the first wave because we assumed that these characteristics are time invariant.

Control Variables

Since a variety of factors can influence venture performance, we included several control variables. *Industry effects:* Consistent with previous literature (e.g., Chowdhury, 2005; Foo et al., 2005), we controlled for industry types because different business segments are characterized by varying levels of difficulty of entry and intensity of competition. We used the first digit SIC code to classify different industries to ensure enough firms in each industry category. *Venture opportunity type.* Venture creation processes are different for innovative and imitative ventures (Samuelsson and Davidsson, 2009). Pursing an innovative ventures entails more uncertainty and complexity, thus requiring entrepreneurs to conduct more organizing activities (Samuelsson and

Davidsson, 2009). We identified two types of opportunities: innovative opportunity and imitative opportunity. We measure imitative opportunities as those businesses that offer the same or similar product or services to potential customers, and innovative opportunities as those that offer very different products or services. This classification is consistent with Dahlqvist and Wiklund (2012) who argued that market newness as the primary dimension along which to measure different types of opportunity. We coded a “1” to represent an innovative opportunity coded a “0” to represent an imitative opportunity. About 68 percent of our sample teams pursued innovative opportunity and 33 percent pursued imitative opportunity. *Team size* is argued to influence team processes and in turn performance (Foo et al., 2006). Specifically, larger team size indicates more human and social capital, making them less likely to fail than smaller teams (Carroll and Hannan, 2000; Delmar and Shane, 2004). In our sample, 80 percent of teams are made up of 2 members and 12 percent are made of 3 members. *Founders’ human capital* was argued to influence the persistence of new ventures (Delmar and Shane, 2004; Liao and Gartner, 2006; Steffens et al., 2012). We controlled for *prior startup experience, industry experience and managerial experience*. Prior startup experience was measured by summing the count of new ventures started by the team members before the current one. Industry experience within the team was measured as the total number of years of full-time work experience related to the industry of the new venture. Managerial experience was measured as a sum of each team member’s total number of years of managerial responsibilities.

3.3. Analytical Approach

Davidsson and Honig (2003) relied on the Swedish version of PSED to analyze dependent variables very similar to ours (number of organizing activities performed and reaching profitability). For the estimation of number of organizing activities they relied on OLS regression.

Following their lead, we tested normality assumptions and found that they were not violated for our data (Shapiro-Wilk test for normality: $w=0.99$; $p>0.12$). Therefore, we followed the lead of Davidsson and Honig (2003) and used OLS regression. As noted below, we also used alternative specifications (Poisson distribution because number of organizing activities performed is a count variable) as robustness tests.

Rather than using logistic regression for estimating firm performance (Davidsson and Honig, 2003), we followed the recommendations of Delmar and Shane (2004; Shane and Delmar, 2004; Delmar 2015a, 2015b) who also analyzed the Swedish PSED data. They forcefully argue that event history analysis is the appropriate analysis method for this type of data because it allows unbiased estimations given that some startup attempts are abandoned during the study; others are still active but never turn profitable during the timeframe of our study; and some do turn profitable. We treat disbanded nascent ventures as censored in the month of their disbanding. Nascent ventures not yet established during the last survey wave but still trying are viewed as censored in the month of last observation. Specifically, we used Cox Proportional Model which makes no distribution assumptions of the transition rate (Blossfeld et al., 2012) because there is no theory to guide us in terms of determining the functional form of the transition rate. An important consideration is the setting of the clock, i.e., the choice of initial time of being at risk. PSED II had detailed information about the date of each of the organizing activities and we define the start time of being at risk as the month when the team undertook its first organizing activity. This definition is consistent with previous studies (e.g., Davidsson and Gordon, 2012).

4. Results

4.1. Descriptive and hypothesis testing

Table 1 presents descriptive statistics and correlations. It can be noted that the mean for business plan is 0.80, suggesting that 80% of all entrepreneurial teams in our study have a business plan. Further, the mean of 0.40 for the business plan revision variable suggests that 40% of the teams modify their plan during the course of the study. This latter result may signal that not all ventures use a business plan solely as a signal of legitimacy to external parties, as suggested by some scholars (Honig and Karlsson, 2004), but challenged by meta-analytical evidence (Brinckmann et al., 2010). It would seem that revisions to a business plan would be a waste of time if it only has symbolic value. We also note that correlations between business plan and team performance is positive and statistically significant. The same holds for the correlation between business plan revision and team performance.

Table 2 presents the regression models of team performance. Model 1 shows the base model including control variables only. Industry effects are suppressed to conserve space. We note statistically significant positive effects of startup experience (0.64; $p < 0.001$) and industry experience (0.04; $p < 0.05$), as could be anticipated, and which is consistent with prior findings (Delmar and Shane, 2004; Steffen et al., 2012). More experienced teams exhibit higher team performance. Among the diversity measures, we note that team performance increases only with greater sex diversity but not the other diversity indicators. This is different from some of the previous findings arguing that functional diversity, education level diversity or experience diversity can enhance some performance measures such as team viability and sales growth (e.g., Foo et al., 2006; Vissa and Chacar, 2009). However, it is consistent with some other studies (e.g., Chowdbury, 2005) and with our theoretical model. Diversity brings both informational benefits and drawbacks. These pros and cons of diversity may very well cancel out each other in the new venture context that requires fast and frequent decision-makings. We didn't find any statistically

significant relationships between race and age diversity with organizing activities, which corresponds to studies and meta-analyses that indicated limited association between two (Certo et al., 2006; Chowdhury, 2005; Horwitz and Horwitz, 2007).

In Model 2, we enter the business plan variable. It has a statistically significant positive influence on team performance, which provides partial support for Hypothesis 1, stating that entrepreneurial teams with a business plan outperform entrepreneurial teams without a business plan. In Model 3, we add the interactions between having a business plan and the four dimensions of team diversity. None of the interactions are statistically significant. Thus, we find no support for Hypothesis 3 stating that the greater the diversity, the more teams benefit from a business plan.

Model 4 enters the variable for business plan revision to the base model. It has a statistically significant positive influence on team performance, which provides partial support for Hypothesis 2, which proposes that entrepreneurial teams that revise their business plan during the startup process outperform teams that don't. In Model 5, we add the interactions between business plan revision and the four dimensions of team diversity. A positive and statistically significant interaction effect is found between business plan revision and education level diversity (7.26; $p < 0.05$). This provides some preliminary partial support for Hypothesis 4. It states that the greater the diversity, the more teams benefit from revising their business plan.

Table 3 instead shows the event history models of firm performance. One assumption of Cox proportional hazard models is proportionality. We tested this by using the Schoendeld and scaled Schoenfeld residuals tests (Grambsch and Therneau, 1994). Neither test generated statistically significant results. Thus, proportional assumptions are not violated. Again, Model 1 is the base model with control variables only. Neither team size, nor any of the experience variables are related to firm performance. This is consistent with some prior studies using similar data (e.g.,

Liao and Gartner, 2007). However, we found sex diversity to be negatively related to the hazard of success (hazard ratio: 0.33; $p < 0.05$). An increase in one unit of sex diversity reduced the hazard of success by 67%. This is consistent with Kwapisz et al. (2014) who found that out of all diversity measures, only sex diversity was related (negatively) to startup success. They relied on PSED II as well, but had merged these data with PSED I and PSED II datasets. This provides some evidence of validity for our findings.

Looking at Model 2, we found no statistically significant influence of a business plan on firm performance. Thus, we do not find additional support for Hypothesis 1, which states that entrepreneurial teams with a business plan outperform entrepreneurial teams without a business plan. Thus, overall, we find support for Hypothesis 1 regarding business plan influencing team performance but not firm performance. Model 3 adds the interactions of business plan with the diversity indexes, corresponding to Hypothesis 3, which states that the greater the diversity, the more teams benefit from a business plan. The interactions between business plan and all of the diversity measures are non-significant. Thus our Hypothesis 3 regarding the firm performance is not supported. Overall, we find partial support for Hypothesis 3 regarding team performance but no support regarding firm performance.

Again in Model 4, we find no influence of business plan revision on firm performance. Thus, our Hypothesis 2 regarding firm performance is not supported. Overall, we find support for Hypothesis 2 regarding business plan influencing team performance but not firm performance. Model 5 corresponds to the test of Hypothesis 4, which states that when entrepreneurial teams revise their business plan, the more positive the impact of entrepreneurial team diversity on performance. The table shows that the interaction between business plan revision and education level diversity is statistically significant (9.09; $p < 0.05$). Translating this hazard ratio of 9.09 into

coefficient, we get $\ln(9.09) = 2.21$. The positive sign of this interaction coefficient indicates that business plan revision enhances the effect of education level diversity on the hazard of success. This finding provides partial support for our Hypothesis 4, which states that the greater the diversity, the more teams benefit from revising their business plan. This provides some additional preliminary partial support for Hypothesis 4.

In order to determine the nature of the interactions, we plotted the performance of teams as a function of education level diversity for teams revising or not revising the business plan while keeping other variables at their means, as recommended in the literature (Cameron and Trivedi, 2009). The plots for team performance is presented in Figure 1a and the plots for firm performance are presented in Figure 1b. Figure 1a shows that team performance increases with increases in team diversity for those teams that revise their business plans, while the opposite applies to teams that do not revise their business plans. Similarly, the plot in Figure 1b shows that firm performance increases with increases in team diversity for those teams that revise their business plans, while the opposite applies to teams that do not revise their business plans. These two plots provide show that the preliminary support for Hypothesis 4 is upheld. A summary of the hypothesis tests and outcomes is provided in Table 4.

4.2. Robustness check and post hoc analyses

We conducted several robustness check. First, given that team performance constitutes a count variable we used a Poisson specification instead of the OLS regression. Results were virtually identical. Both the business plan (0.28; $p < 0.001$) and business plan revision (0.36; $p < 0.001$) increase team performance. In addition, the business plan has no significant interaction effects with diversity measures, but business plan revision significantly (0.44; $p < 0.5$) increases the influence of education level diversity on the team performance.

Second, while we do not know the month in which the business plan was revised, we have information about the month in which the original business was conceived. Thus, we are able to perform random-effect Poisson panel regression, clustering standard errors at the firm level, for the influence of having a business plan on team performance (Hypothesis 1 and 3) so as to utilize the longitudinal nature of the PSED data. This allows us to examine how the business plan influences team performance on a monthly basis. We chose random instead of fixed effect because our diversity measures remain stable over time (Cannella et al., 2008). Results are qualitatively identical to our main test, showing a positive relationship (1.08; $p < 0.001$) between the business plan and team performance and no positive interactions between the business plan and the diversity indexes.

Third, in the main test of Hypothesis 2 we placed teams that did not have a business plan and teams that had a business plan but did not revise it into the same category, coding them 0 for business plan revision. As a robustness check, we excluded teams that did not have a business plan from the analysis. This reduced the sample size to 318 teams, 157 (49%) revising their business plans and 161 ventures (51%) not. Results were qualitatively identical to our main test. Business plan revision had a statistically significant positive effect on team performance (4.54; $p < 0.001$) but not on firm performance (1.05; $p > 0.1$). In addition, educationally diverse teams can benefit more from revising the business plan than not revising it, both in terms of team performance (8.45; $p < 0.01$) and firm performance (Hazard ratio: 13.37; $p < 0.5$).

Finally, this research builds on the notion that the business plan constitutes a platform for information elaboration. We set out to test this assumption. PSED II does not include any direct measures of information elaboration. However, the study asks what team members contribute to the new venture including advice, information, training, assistance, resources and services. This

can serve as a proxy as to whether team members communicate, contribute their information and knowledge, and whether shirking is a problem. Thus, we used these six questions as an, admittedly imperfect, proxy for information elaboration. This variable was computed as the sum of all team members' individual contributions divided by team size. We tested the relationship between the business plan and team performance mediated by information elaboration, controlling for startup experience, industry experience and sex diversity, following the guidelines by Baron and Kenny (1986) as shown in Table 5. The results show that having a business plan has a positive and statistically significant effect on information elaboration. Both information elaboration and a business plan have positive and statistically significant effects on team performance. However, the influence of a business plan on team performance is reduced in the presence of information elaboration. The coefficient of a business plan changes from 2.22 to 1.29 with p value changing from statistically significant at 0.05 level to 0.1 level. This suggests full mediation (Baron & Kenney, 1986). A Sobel test further confirmed the mediating effects of information elaboration (z-value 3.29; $p < 0.01$). . Given the substantial measurement error of our information elaboration measure, we believe that these results substantiate our argument that a business plan can serve as an information elaboration mechanism.

5. Discussion

5.1 Reconceptualizing the business plan using an information processing approach

In this paper, we take an information processing approach to the business planning of entrepreneurial teams. We believe that this approach has some particular strengths in the entrepreneurship context. Specifically, in the early stages of venture development, teams largely focus on discovering and making sense of opportunities and then on marshalling needed resources in order to pursue these opportunities. To a large extent, these are information gathering and

processing activities, highlighting the importance for an entrepreneurial team to be able to effectively deal with and elaborate its information. However, entrepreneurial teams face a number of challenges, which can disrupt information elaboration and result in poor performance. A business plan, by facilitating information elaboration, can effectively channel a team's informational resources to help improve performance.

We hypothesized that the business plan would influence both team and firm performance. Generally speaking, we received much stronger support for team performance than for firm performance. This, we believe, can largely be attributed to the way in which we conceptualize and operationalize the constructs. By examining team performance in terms of the completion of activities aimed at moving the nascent venture forward towards a functioning business, we chose an outcome that is a direct and proximal outcome of the team's activities. Firm performance, on the other hand, is influenced by a host of things in addition to how well a team functions together. High failure rates among new ventures speak to that fact. We believe that this is an important insight, and a valuable contribution to the entrepreneurial team literature. Prior studies have observed that relationships between entrepreneurial team characteristics and performance are generally weak and have provided theoretical rationales as to why that is the case (e.g., Klotz et al., 2014). To this we add that it may be overly optimistic to assume particularly strong relationships between *any* entrepreneurial team variables and firm performance because there are so many intervening variables, including the quality of the opportunity pursued (see Shane & Venkataraman 2000 for a similar argument), the actions of competitors, and the economic conditions under which the venture is being launched. Indeed, environmental conditions moderate the influence of team characteristics on firm performance (e.g., Goll and Rasheed, 2005; Halebian and Finkelstein, 1993). Instead, we recommend the reliance of proximal outcomes that are less

influenced by factors other than the functioning of the team. The completion of activities to move the venture forward constitutes such an outcome.

We hypothesized and found that teams with a business plan exhibited higher team performance than teams that operate without a business plan. We also hypothesized and found that teams that revised their business plans during the startup process exhibit higher team performance than teams that didn't. No effects of the business plan were found for firm performance. We believe that these findings add important insights into the pros and cons of business planning (see e.g., Bhide, 2000 ; Delmar and Shane, 2003; Gruber, 2007 for differing views). A main argument against business planning is that devoting time and resources to the plan detracts attention from actually carrying out the activities needed to launch the venture (e.g., Bhide, 2000; Wiltbank et al., 2006). Our findings indicate that that does *not* seem to be the case. On the contrary, our results suggest that the business plan *assists* teams in furthering the launch of the business. Teams with business plans and teams revising business plans completed more rather than fewer organizing activities. We do not intend to claim that this settles the debate about the pros and cons of business plans. We do believe, however, that one proposed causal mechanism (business planning detracting attention from furthering the actual business) is out weighted by the advantages of the business plan serving to coordinate teamwork.

These findings also point to the advantages and implications of conceptualizing the business plan within an information processing framework. Information elaboration is a team-level process. Business planning is effective to the extent that it helps assign roles and functions to team members and to coordinate work. There is little reason to expect any positive effects of a business plan among solo entrepreneurs because there is no need to integrate differing viewpoints or coordinate work. Prior studies have typically examined mixed samples of team-based and

individual-based businesses and placed them on equal footing. Potential differences between effects of business planning for team startups and solo startups, or between small businesses managed by individuals or teams has received virtually no attention in the literature (see e.g., Brinckmann et al., 2010) We believe that this is an important oversight and encourage future studies to more clearly explicate the causal mechanisms of business planning and to ensure sampling appropriate for testing these mechanisms. For example, on the basis of our research it would seem that future studies would benefit from examining separately the effects of business planning in solo and team startups.

Another implication, and arguably an advantage, of our conceptualization of the business plan within the theoretical framework of information processing concerns how it relates to other organizing activities. Rather than placing the business plan on equal footing with other organizing activities such as applying for external funding, developing a prototype, or registering the business with the authorities, we viewed the business plan as a separate category that would facilitate the accomplishment of other organizing activities. Apart from providing sound theoretical grounding for the business plan, we believe that such a view of the business plan corresponds to how many entrepreneurs and other practitioners view the business plan. For example, business plans are commonly viewed as a mechanism to structure information, to generate checklists of what needs to be done, and to initiate action.

5.2. The business plan and team diversity

We hypothesized that the positive implications of business planning would be particularly salient among diverse teams. We found support for business plan revision but not for the business plan. In terms of both team and firm performance, business plan revision can enhance the influence of education level diversity but not functional diversity or experience diversity. This constitutes a

contribution to the literature on entrepreneurial teams. Prior reviews of the field have noticed that most studies evoke the upper echelon perspective and directly associate team characteristics with performance (e.g., Amason et al., 2006; Ucbasaran et al., 2003). Greater theoretical advancement can be made by moving beyond assuming such direct relationships (Klotz et al., 2014). The literature on the pros and cons of entrepreneurial teams has remained inconclusive to date. Some studies suggest that diverse entrepreneurial teams perform better, whereas others find the opposite (e.g., Chowdhury, 2005; Ensley and Hmieleski, 2005; Foo et al., 2006; Vissa and Chacar, 2009). Our finding that the impact of education level diversity on team performance depends on whether they revise the business plan provides a clue as to why the literature has reached such contrasting findings of the implications of diversity. It is only when educationally diverse teams have mechanisms in place to allow information elaboration that they can benefit from their diversity. Specifically, business plan revision as an information elaboration mechanism is more beneficial for educationally diverse teams than the mere existence of a business plan. Diversity in education and knowledge requires teams to spend more time and effort to communicate and adapt to each other (Horwitz & Horwitz, 2007; Dahlin et al., 2005). Thus, actively discussing and updating their information, as reflected in business plan revision, can facilitate this adaptation and communication process. Such a finding is fully aligned with the information processing approach to teamwork. Team diversity does not necessarily lead to superior performance but depends on whether certain mechanisms are at place to motivate information elaboration and to make use of this diverse informational pool (e.g., van Knippenberg et al., 2004). To the best of our knowledge, ours is the first attempt to open the “black box” between entrepreneurial team diversity and performance adopting an information processing view. We believe we have reached some

important insights by doing so and hope this paves the way for others to apply this perspective in future studies of entrepreneurial teams.

5.3. Limitations and future research

Our study has some limitations. Notably, our measure of the writing and revision of a business plan were based on the response to yes or no questions. More fine-grained measures such as frequency of team meetings for writing the business plan, or more detailed information about the extent of the business plan and how it was used would have been better. The greater the attention and energy spent on writing and communicating the business plan, the more salient the degree of information elaboration. This coarse-grained nature of key variables can potentially explain the relative lack of findings, because it enhances random measurement error, which attenuates results. Moreover, one of the strengths of the PSED II sample is that it constitutes a representative sample of all startup attempts in the US. However, this also leads to a heterogeneous sample with extensive unobserved heterogeneity, which further attenuates results. Future research would benefit from examining more homogeneous samples, such as new ventures within one specific industry (see e.g., Davidsson, 2005), and by using more fine-grained measures of information elaboration. This would likely lead to stronger results. Further, Klotz et al. (2014) suggested that different kinds of diversity might have different implications for outcomes. The inclusion of additional relevant aspects of diversity would thus be beneficial. For example, it appears that diversity in terms of experience from different industries should be highly relevant.

6. Conclusion

We propose that business planning can be productively conceptualized within an information processing framework. Doing so enable us to examine in detail the informational obstacles of teamwork and how the business plan can function to alleviate those obstacles.

Moreover, it is important to examine under what conditions the business plan can be more effective. Using an information processing approach to teams, we found that educationally diverse teams can benefit more from the business plan because diversity implies unique informational challenges. The writing, use and revision of a business plan can enhance the informational benefits while at the same time reducing the informational challenges imposed by diversity. Stated differently, these findings suggest that the more 'ambitious' startups, as signified by a business plan, benefit the most from team diversity. The findings call for entrepreneurship researchers to reexamine the role of business plan from a different angle and move beyond assuming a direct relationship between team diversity and performance.

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Table 1

Descriptive Statistics and Correlations

	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Team performance	15.13	7.20	1													
2. Venture opportunity type	0.68	0.47	-0.04	1												
3. Team size	2.28	0.64	0.04	0.01	1											
4. Prior startup experience	0.91	1.86	0.18***	0.11*	0.28***	1										
5. Industry experience	17.11	18.98	0.17***	-0.015	0.21***	0.10*	1									
6. Managerial experience	23.78	20.22	0.17***	0.06	0.38***	0.34***	0.43***	1								
7. Age diversity	0.12	0.14	-0.0001	-0.07	0.30***	0.05	0.20***	0.11*	1							
8. Race diversity	0.08	0.18	-0.09	-0.001	0.08	-0.06	-0.04	-0.09	-0.02	1						
9. Sex diversity	0.34	0.23	0.08	-0.004	-0.11*	-0.13*	-0.07	0.01	-0.21***	-0.05	1					
10. Education level diversity	0.34	0.25	0.004	-0.05	0.27***	0.12*	0.07	0.16**	0.16**	0.004	-0.02	1				
11. Functional diversity	0.48	0.16	-0.09	0.02	0.43***	0.05	0.03	0.11*	0.18***	0.02	0.12*	0.19***	1			
12. Experience diversity	0.42	0.39	-0.12*	-0.03	0.15**	-0.07	-0.01	-0.14**	0.46***	0.03	-0.10*	-0.04	0.14**	1		
13. Business plan	0.80	0.40	0.23***	0.01	0.03	0.07	0.05	0.06	0.03	0.004	0.09	0.006	-0.01	0.001	1	
14. Business plan revision	0.40	0.49	0.37***	0.04	0.05	0.03	0.14**	0.07	0.01	0.04	-0.07	0.01	-0.14**	-0.12*	0.40***	1

Pairwise correlations reported (pworth in STATA)

N=396; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2
Estimation of team performance

	Model 1	Model 2	Model 3	Model 4	Model 5
Industry effects	Included	Included	Included	Included	Included
Venture opportunity type	-0.46	-0.45	-0.44	-0.78	-0.82
Team size	-0.08	0.05	0.03	-0.31	-0.36
Prior startup experience	0.64 ^{***}	0.60 ^{**}	0.59 ^{**}	0.68 ^{***}	0.72 ^{***}
Industry experience	0.04 [*]	0.04 [*]	0.04 [*]	0.03	0.02
Managerial experience	0.02	0.01	0.01	0.02	0.02
Age diversity	2.45	1.97	1.97	1.45	1.51
Race diversity	-2.32	-2.44	-2.47	-2.74	-3.01 ^T
Sex diversity	3.72 [*]	3.05 ^T	3.03 ^T	3.97 [*]	3.90 [*]
Education level diversity	-0.50	-0.44	-1.78	-0.52	-3.30 ^T
Functional diversity	-4.77 ^T	-4.44 ^T	-8.18 [*]	-2.03	-1.86
Experience diversity	-1.61	-1.61	-1.06	-0.71	-0.55
Business plan		3.84 ^{***}	1.27		
Business plan * education level diversity			1.69		
Business plan * functional diversity			4.74		
Business plan * experience diversity			-0.73		
Business plan revision				5.13 ^{***}	3.20
Business plan revision * education level diversity					7.26 [*]
Business plan revision * functional diversity					-0.68
Business plan revision * experience diversity					-0.55
R^2	0.12	0.16	0.17	0.23	0.25
ΔR^2		0.04 ^{***}	0.01	0.11 ^{***}	0.02 ^T
<i>Model F</i>	3.32 ^{***}	4.42 ^{***}	3.88 ^{***}	6.68 ^{***}	6.50 ^{***}
<i>N</i>	396	396	396	396	396

^T $p < 0.1$ * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3Estimation of firm performance ^a

	Model1	Model2	Model3	Model4	Model5
Industry effects	Included	Included	Included	Included	Included
Venture opportunity type	0.95	0.95	0.97	0.95	0.99
Team size	0.82	0.82	0.78	0.82	0.78
Prior startup experience	1.01	1.01	1.00	1.01	1.03
Industry experience	1.01	1.01	1.01	1.01	1.00
Managerial experience	1.00	1.00	1.01	1.00	1.01
Age diversity	2.63	2.62	2.69	2.61	3.43
Race diversity	0.81	0.81	0.82	0.80	0.84
Sex diversity	0.33*	0.33*	0.32*	0.33*	0.35*
Education level diversity	0.96	0.96	1.02	0.96	0.35
Functional diversity	1.71	1.70	0.69	1.74	2.80
Experience diversity	0.83	0.83	1.56	0.83	1.05
Business plan		0.95	0.82		
Business plan *education level diversity			1.01		
Business plan* functional diversity			2.99		
Business plan * experience diversity			0.45		
Business plan revision				1.04	0.93
Business plan revision * education level diversity					9.09*
Business plan revision * functional diversity					0.51
Business plan revision * experience diversity					0.49
<i>Log likelihood</i>	-431.56	-431.55	-430.73	-431.55	-428.17
<i>Δ Log likelihood</i>		0.01	0.82	0.01	3.39*
<i>Wald chi2</i>	20.39	20.70	22.83	20.45	33.88
<i>N</i>	396	396	396	396	396

^a Coefficients are hazard ratios^T $p < 0.1$ * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4

Summary of analytical results

	Team performance	Firm performance
Business plan (H1)	Y (+)	N
Business plan revision (H2)	Y (+)	N
Business plan * diversity (H3)	N	N
business plan revision * diversity (H4)	Y (education level diversity) (+)	Y (education level diversity) (+)

Table 5

Mediated regression of having a business plan or not, information elaboration, and team performance

DV: team performance	Coefficient
Business plan	2.22**
Prior startup experience	0.66**
Industry experience	0.05**
Sex diversity	3.71*
R ²	0.08
Model F	9.34***
N	396
DV: information elaboration	
Business plan	0.47***
Prior startup experience	-0.01
Industry experience	0.01*
Sex diversity	-0.04
R ²	0.05
Model F	5.03***
N	396
DV: team performance	
Information elaboration	1.98***
Business plan	1.29 ^T
Prior startup experience	0.68***
Industry experience	0.04*
Sex diversity	3.78***
R ²	0.21
Model F	20.18***
N	396
Direct effect	1.29 ^T
Total effect	2.22**

^T $p < 0.1$ * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 1a

Education level diversity, business plan revision and team performance

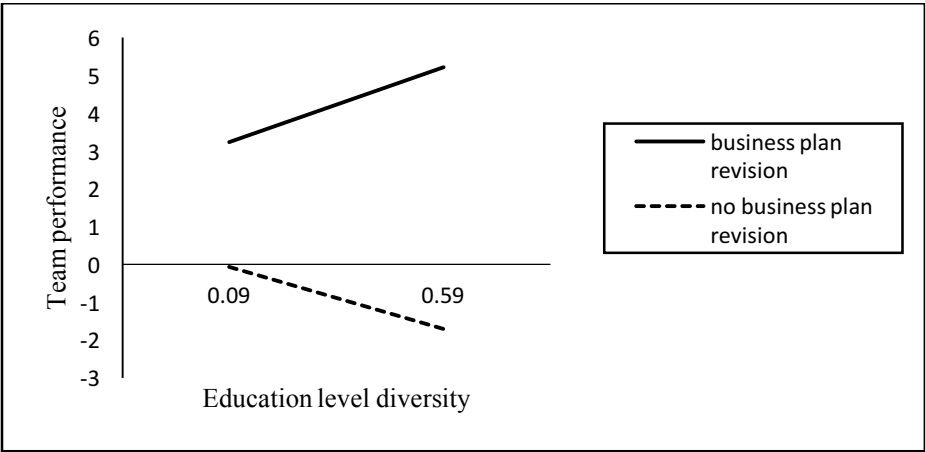


Figure 1b

Education level diversity, business plan revision and firm performance

