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EFFECTS OF TEAM STRUCTURE ON INNOVATIVENESS: AN EMPIRICAL STUDY

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Abstract

Teamwork is gaining increasing attention in broader management research. In this research we aimed to bring together disparate research on the effects of team roles and why team role composition has an effect on innovation. By using experience based theory on the team composition advanced by Kelley & Littman (2005), we make conceptual and empirical contributions. We develop theoretical logics to explain why team structure that includes key team roles leads to better innovative performance, and propose pertinent hypothesis. Experimental-empirical research and quantitative analysis was conducted on several samples of teams. While results show that teams that possess the major competences proposed by Kelley are more innovative, preliminary results also show that not all team roles are equally important. We discuss the implications of our findings for future research and managerial practice.

Key words: Team, Innovativeness, Structure, Roles, Kelley

Topic group: Entrepreneurship, management, teams, innovation

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INTRODUCTION

Teamwork is gaining increasing attention in broader management research (Kozlowski & Ilgen, 2006). Despite the depth of prior research on team performance (e.g. Banker et al., 1996; Stewart & Barrick, 2000), research findings are not cumulating (e.g. Jehn & Mannix, 2001). Moreover, while existing studies highlight many differences across teams' innovative performance, and underscore the importance of considering composition of team roles in the study, they do less to conceptualize about *how* and *why* composition of team roles impacts innovative performance.

Further, evidence from business practice demonstrates that an increasing number of start-ups are successfully founded by teams (Feeser & Willard, 1990). Entrepreneurial teams are oftentimes defined as "two or more individuals who jointly establish a firm in which they have a financial interest" (Kamm et al., 1990). In entrepreneurship, team heterogeneity is crucial for product innovativeness (Henneke & Luthje, 2007), team learning (Clarysse & Moray, 2004) firm performance (West, 2007) and the venture's ability to acquire resources for growth (Hayton & Zahra, 2005), but little is known so far about processes that lead to successful team formation.

Taken altogether, research in determinants of team performance has been growing over the past few years, with team structure being emphasized as one of the main reasons for deviation of team performance and innovation (e.g. Cohen & Bailey, 1997; DeCusatis, 2008). In particular, individual characteristics and attributes of team members influencing allocation of tasks and authority have been attributed a crucial role in team performance (O'Neill & Allen, 2011; Peeters et al., 2006) and team innovation (Bell, 2007).

The lack of solid theoretical foundations for studying the impact of team roles composition on innovation performance represents a significant gap in literature and demands attention in order to enable more systematic future research. In this paper, we begin to fill this gap by building conceptual logics of effective team role composition from the Kelley and Litman (2005) team formation theory. The theory emphasizes that team members' diversity, skills, abilities, responsibilities and personalities affect team innovativeness and performance. The theory is built upon authors' fieldwork experiences and has yet not been validated.

Our specific contribution is conceptual and empirical. First, we develop theoretical logics and proposition explaining why team structure that includes key team roles leads to better innovative performance of teams. Second, we test our proposition using experimental techniques. Third, while most of the existing research on teams was focused either on the micro-level to explore individual member contribution to innovativeness, the leadership style of teams (e.g. Oldham & Cummings, 1996) or the macro-level to explore effects of organizational design, industry specific attributes, prior ties, and demographic homogeneity on teams' performance (e.g. Eisenhardt & Tabrizi, 1995), to our best knowledge not many

studies focused on the meso level of research. According to Klein and Kozlowski (2000), the meso level is an important perspective when researching teams, because it allows better understanding of intra-team interactions and behaviour as well as its external influences (Glynn et al., 2010).

By identifying and validating characteristics of balanced team structure that entrepreneurs should pay specific attention to, we provide practical implications that can help firms enhance their competitiveness. Given the nascency of this research stream we find the qualitative methodological approach appropriate to explore the motives, feelings, values, attitudes and perceptions that underlie and influence the behaviour of individuals in a team (Merriam, 1998; Patton, 2002). As a research strategy, multiple experiments were selected and conducted on 3 different samples, which included several cases.

LITERATURE REVIEW AND HYPOTHESIS

Team work facilitates firm innovation because diversity, skills, knowledge breadth and interactions among team members contribute effects that are more than a simple sum of individuals' contributions (Burpitt & Bigoness, 1997; Jehn et al., 1999) foster knowledge creation and acquisition (Edmondson, 2002), and enhance creative potential of team members (Taggar, 2002). Innovation often has seeds in the mind of a creative individual, but requires the whole team to analyze and develop (Tang, 1998).

Although existing literature on team performance is rather fragmented, research is generally focused on member diversity and team roles. Belbin's model of team roles has recently gained a lot of attention and criticism. According to Belbin, team roles are defined as a pattern of six factors: personality, mental ability, current values and motivation, field constraints, experience and role learning. Although Belbin (2010) does not show how much of the variance of a specific role is explained by individual factors, she argues that all roles should acquire a balanced representation in a team (Aritzeta et al., 2007). However, not all studies could verify the Belbin roles' contribution to innovation and performance (e.g. Anderson & Spleap, 2004; Rushmer, 1996).

In this study we focus on the experience based theory of Kelley and Littman (2005) that argues that any team should include team roles from three major domains: (1) learning, (2) organizing, and (3) building. For each of the roles, its characteristics and task responsibilities are linked to the positive effect they hold on innovation and performance. Drawing from the fact that teamwork depends upon individual contributions, and that each of the characteristics and responsibilities has an individual influence on innovation, we expect that a team will be more innovative and effective with members covering each of the roles explained hereinafter (Stewart & Barrick, 2000; Tjosvold et al., 2009).

The learning roles are crucial for the firm's performance, as knowledge provides a basis for a competitive edge and fosters innovation (e.g. Cohen & Levinthal, 1990; Grant, 1996). Learning roles, which include the Anthropologist, the Experimenter, and the Cross-Pollinator, are in charge of expanding knowledge by constantly gathering new information.

The Anthropologist's task is to observe the market and develop a deep understanding of the latent needs of society and the way people interact with products. The most prominent characteristics of this role are open-mindedness, a developed intuition and possession of empathy (Kelley & Littman, 2005, pp. 15-40). In prior research, these characteristics have been significantly related to innovativeness. For example, open-mindedness was shown to positively impact creativity, imagination, originality and knowledge breadth (e.g. Baer & Oldham, 2006).

The Experimenter's task is to make ideas tangible. The most prominent characteristics of this role are risk-taking and learning from failures. Trial and error learning improves the development process and fosters creativity and innovation (e.g. Farson & Keyes, 2003), and risk-taking affects creativity in terms of idea boldness (e.g. Baucus et al., 2008), innovativeness (e.g. Cabrales et al., 2008) and firm performance (e.g. Antoncic, 2003).

The Cross-Pollinator's role is to provide knowledge breadth to the team. The variety of knowledge and skills of this role enhances opportunity recognition (Kogut & Zander, 1992), new product development (Leonard-Barton, 1995), creativity and innovation (Sakkab, 2007), and flexibility (Volberda, 1996).

The organizing roles are in charge of moving ideas forward in organizations. Organizing is essential to teams as it provides a path to follow, to connect and to integrate all the members into a team by setting goals and motivating other team members. These roles also manage team resources such as time, effort, and financial resources (Kelley & Littman, 2005).

The Hurdler is the entrepreneur of the team, persistent, optimistic and determined, with great problem solving skills. In the past, persistence has been positively related to innovation activity (e.g. Wong et al., 2009). Optimism was shown to have a positive effect on individual behaviour (Peterson et al., 1998), problem recognition (Papenhausen, 2004) and confrontation (Geers et al., 2003), career success (House et al., 1991), and innovativeness (Gary, 2003). In stable environments, optimism enhances a firm's performance (Hmieleski, 2007).

The role of Collaborator is to assign roles to other team members, depending on the problem set and the skills needed, and to inspire teams with confidence (Kelley & Littman, 2005, pp. 113-140). Collaboration has been recognized as an essential part in fostering innovation activity through idea generation (Barczak et al., 2010; Brown, 2005; Brown & Katz, 2009) and speeding up the product development process (e.g. Brown & Eisenhardt, 1995). The

collaborator's main goal is to ensure that the full potential of a team in attaining innovativeness and performance is realized.

The Director is the operative manager of the team. By taking a holistic perspective of the challenge, the director instils the team with inspiration, motivation and empowerment (Kelley & Littman, 2005, pp. 141-164). Empowerment is important for the creation of trust (Brunetto & Farr Wharton, 2007), autonomy and power in decision-making (e.g. Spreitzer et al., 1997), proactiveness, open communication, and shared vision and common goal (Ahmed, 1998), which have all been shown to lead to enhanced performance, self-efficacy (Eylon, 1997) and innovation (e.g. Jung et al., 2003).

The building roles integrate information gathered by the learning roles with the empowerment of the organizing personas into a combination that allows and fosters innovation. The Experience Architect creates unique consumer experiences to satisfy market needs. By having the capability of transforming a product or service into an extraordinary experience (Kelley & Littman, 2005, pp. 165-192), the role fosters innovation performance. Indeed, design literature suggests that focusing on the functional performance of products is not sufficient; innovating firms need to consider a product's emotional satisfaction and market latent needs as well (Leavy, 2010; Li et al., 2007). Many contemporary business success stories relate to new experiences (Martin, 2007, 2009); companies such as Apple, P&G, Four Seasons, Red Hat, Cirque de Soleil brought to the market what people had not even known they need or want.

The Set Designer has the capability of transforming ordinary work environments into a powerful tool that stimulates creativity and fosters innovation by affecting participants' behaviour. Work environment was determined as an important factor in stimulating an individual's creativity, affecting creative performance and innovation as a result (Oldham & Cummings, 1996). Different scholars suggest various characteristics that influence creativity, for example Amabile et al. (1996) showed the positive influence of different work environment factors (encouragement, freedom, sufficient resources, pressure, organisational impediments) on creativity.

The Storyteller builds morale and environmental awareness by fostering the transmission of values, emotions and objectives through fascinating stories. Stories have a greater power of persuasion than any other facts or reports and are also the channel through which knowledge, norms and values are exchanged and shared in pursuit of emotional connection (e.g. Boyce, 1996). They enhance trust and commitment through greater understanding, provide new perspectives on the problem, and are a source of inspiration and simulation. The Storyteller has a specifically instrumental role when the team pursues radical innovation (Beckman & Barry, 2009; Sole & Wilson, 1999).

The Caregiver is a customer-focused role with strong empathy to promote and further enhance the consumer experience (Kelley & Littman, 2005, pp. 215-240). The Caregiver is able to step

into the customer's shoes (e.g. Ambrose & Harris, 2009), which results in much greater innovativeness, as many new ideas are exposed (e.g. Li et al., 2007).

The purpose of the review above was to provide theoretical ground for the empirical use of the »Ten faces of innovation« theory for innovation. Given that each of the roles has an influence on innovation by itself, we argue that teams that include all of the roles discussed above should also be significantly related to innovation (Stewart & Barrick, 2000; Tjosvold et al., 2009). This leads us to propose:

Hypothesis: Team structure that includes the major roles proposed by Kelley (2005) will be more innovative than teams that encompass a random combination of individuals.

In this case, "a role" is considered an attribute in a team and is not necessarily linked to one team member only. Moreover, each member of a team can possess more than just one role.

RESEARCH DESIGN

Research strategy, measures and data analysis

This research uses a combination of qualitative and quantitative research methods (Bryman, 2006; Tashakkori, 2006). Qualitative research (experiments) was used to get better insight into the phenomenon within its real-life context (Denzin & Lincoln, 1994; Patton, 2002; Yin, 2009) and to understand underlying emotions and cognitions within a team (e.g. Sørensen et al., 2010). Quantitative research (linear regression) was used to provide additional support to the relationship between the presence of team roles and innovation.

The experiment was conducted on 3 different samples. The first sample was composed of 13 teams of international students enrolled in the Entrepreneurship course at the local university. They were observed working on two different projects during a 6 month time frame. The second sample included 11 teams of Engineering major students enrolled at the local university. They were observed working on a single project during a 4 month time frame. The third sample consisted of 10 teams of individuals, aged between 20 and 58, with diverse backgrounds. They were observed during a one day experimental study. All participants volunteered in the experiment, in which teams were given a problem set to solve within a given time frame. The time frame varied according to the task, from 8 minutes up to 4 months. In the meantime, their team interaction was carefully monitored to get an in-depth insight of team dynamics and to identify member team roles. To obtain more detailed information of the team we surveyed the participants in the experiment using a structured questionnaire. The survey instrument included questions about team members and was tested on a group of post-graduate students at the local university prior to being used in the experiment (see Appendix).

The independent variable was measured through questions in the survey. Individual scores were then used to calculate the team role score with only the role scores of members receiving at least 50% of the voted size being considered. The index was calculated as the sum of individual shares (the amount of rates compared to the maximum amount of rates a person can get). The dependent variable (team innovativeness) was assessed by experts' opinion. Three experts individually evaluated teams' projects in terms of innovativeness on a scale 0 – 100 %. For the purposes of the study the average rate of innovativeness for each team was calculated.

Samples

Sample 1 was composed of students of Entrepreneurship, aged between 19 and 24. They were requested to finish 2 projects (cases 1 and 2), each during a 5 week time frame. Case 1: The problem involved designing a new cafeteria on the school's patio. They were assigned to 6 different teams, consisting of 5 to 6 members each, and were given 5 weeks to finish the project. Throughout the execution of the project the teams were regularly monitored and each member needed to fill out the questionnaire on teamwork. Team innovativeness was also assessed at that point by three experts. Case 2: The second case was conducted on the same group of students, but with different team composition. Students were requested to form teams volitionally. There were 7 teams in this case, each consisting of 4 to 5 members. They were given three similar problem sets to choose from and were allowed 6 weeks to finish their projects. Throughout the execution of the project the teams were regularly monitored and each member needed to fill out the questionnaire on teamwork. Team innovativeness was also assessed at that point by three experts.

Sample 2 included two groups of students (cases 3 and 4) majoring in Engineering, aged between 18 and 25 years, who were requested to finish two projects within a time frame of 3 months. Cases 3 & 4: Students were given 3 months to finish a business project of their own. Based on design thinking principles they had to develop their own idea and then present it in a business plan format. Throughout the execution of the project the teams were regularly monitored and each member needed to fill out the questionnaire on teamwork. Their presentation, along with the business plan, was rated by independent experts who also evaluated each team's project innovativeness.

Sample 3 included 25 randomly selected individuals, aged between 20 to 58, who formed 5 teams for the first two creative problem sets, and were later on assigned different teams for the next two problem sets. The duration of the tasks was between 8 and 45 minutes. Case 5: Five teams were formed volitionally and were given a "warm-up" task of constructing an instrument for eating any kind of food when on a hike or in the mountains. They had 45 minutes to finish their task. Afterwards they were requested to evaluate each other by filling out the questionnaire. Three experts assessed team innovativeness. Case 6: teams were formed based on the results from the questionnaire. Individual scores of the roles they possessed enabled the formation of the following five teams: (a) team 1 included participants who had

developed several strong personal team roles in the first problem set; (b) team 2 and team 3 consisted of individuals who had not significantly expressed any of the roles in a team; (c) team 4 and team 5 were composed of individuals who had expressed a maximum of 2 roles, and, as a combination of members, covered all ten necessary roles.

These teams were given two problem sets. The first was a short, impulsive one, whereas the second was similar to the previous experiment. We chose two different tasks that required different completion times, as we wanted to gain insight into the effect of stress and restraints. As the teams remained the same during both tasks, the role score index was evaluated with one questionnaire for both tasks after the second task was finished. Furthermore, innovativeness was calculated as an average of both problem set scores. In the first problem, teams were given a short team building exercise. The first task included construction of a floating boat within 8 minutes. If the team completed the task, it was given the opportunity to race with its boat by blowing into it in a small pool. The teams' innovativeness was rated accordingly to exercise rules. The second problem required designing an innovative solution to existing camera bags (with specimen). At the end of 45 minutes, team members evaluated their partners with a questionnaire. The team role score was then calculated as the sum of both individual scores, and experts rated innovativeness of the solution.

DATA ANALYSIS AND RESULTS

The qualitative research results (observation, interviews) provided evidence to support our hypothesis that the number of roles influences a team's innovative performance. Teams that had more roles demonstrated higher innovativeness in their solutions. In addition, as the sample was of sufficient size, a linear regression analysis was used to assess the effect of the roles on innovativeness. We tested our hypothesis using a linear regression model of standardized coefficients. We obtained the following regression coefficient:

$$\text{Innovativeness} = 0{,}68 \times \text{Role},$$

which denotes that innovativeness is predicted to increase by 0,68 when the role variable goes up by one. "Role" in the regression model marks the overall team role score that was calculated from questionnaire data. The significance level of the coefficient was 0,000 (t=5,518). The coefficient of determination (R^2) was 0,46, indicating that 46% of the total variance in innovativeness was explained by this linear regression model, which left the rest of the variance (54%) as variability of the data from the model. Unquestionably, the argumentation above provides sufficient reasoning to confirm our hypothesis. Accordingly, teams of members covering a larger portion of the roles proposed by Kelley are more innovative than teams that encompass a random combination of members.

In what follows we discuss each of the executed experiments in detail, based on our monitoring of the teams. The first experiment supported the idea that teams that achieve a

better role score are more innovative. The upper three teams according to innovativeness rank were also the upper three teams based on role score rank. The team that achieved the highest role score got the second best result in innovativeness, whereas the team that placed first on the innovativeness scale reached the second highest role score index. Teams 6 and 2 attained 3rd and 4th place according to their role score and the same places in innovativeness. In addition, teams 3 and 5, whose solutions to the problems were the least innovative, scored the lowest on the role scale. The second experiment included 7 teams. The results of this experiment further support the hypothesis. Teams that ranked in the upper half of role score results achieved better cumulative innovativeness as opposed to the lower half of ranked teams. Results of the second sample (cases 3&4), which was composed of technical students, provided supporting evidence for the existence of a relationship between the ten roles and team innovativeness. The role score rank that each team attained in the third experiment matched entirely with their innovativeness rank. Likewise, the fourth case proved almost identical, with a minor deviation in the two teams that achieved the lowest role score rank.

In the first case of sample 3 (*case 5*), three teams that scored at the top of the role scale took the top three positions in the innovativeness scale rank, with a slightly different distribution. Furthermore, teams 4 and 5, which reached the lowest position with regard to their role score, also hit the bottom two positions in their innovativeness rank. On the other hand, the results from the second case of the third sample (*case 6*) align with the hypothesis, despite the fact that one team (team 2) did not co-operate as expected. According to observation and members' comments, they did not realize the seriousness of the task presented. However, despite noticed deviations within specific experiments and the results differentiating and varying across samples, the overall study shows the significant importance of the role factor when predicting team innovativeness. The results are presented in table 1.

Table 1 about here

The six-case experiment tested how these ten types of roles work together in real time environments. The first team included those individuals that had achieved the highest role scores individually in the fifth case, which in practice meant that they had significantly developed and adopted three or more different roles. The team was unsuccessful in completing the first task, which lasted 8 minutes. A clash of roles appeared, team productivity was inhibited by members spending too much time figuring out and determining their roles. Members within a team were not working as a team. Rather, they were acting as a team of non co-operating individuals, each of them trying to find a solution individually. When asked, participants expressed their feelings, noting that the exercise was one of the worst teamwork experiences of their lives. This inability to collaborate also reflected in their role score index. According to normal expectations, a team of individuals with high individual role scores would ultimately lead to a team with a high role score. On the contrary, their strong

personalities suppressed their team roles and they rated each other poorly in the questionnaire at the end of the project.

However, despite difficulties experienced during the first task, the team achieved much better results in the second task, which was of a longer duration. Albeit only three members in the team actually participated in the problem-solving activity their collaboration was taxing and full of adaptation. They came up with a solution that brought them the highest innovativeness score (of all cases). Accordingly, we can assume that innovativeness is positively related to the number and strength of roles mostly in the long run and if the roles do not overlap. Notwithstanding, their average innovativeness score was, due to the equivalent weight of the both tasks, still low and matched completely with the low role score index they attained.

The second and the third team were organized with participants that had not developed any significant role in their team in the first part of the experiment. According to their internal evaluation and observation, some of these individuals developed significantly more roles than in the first team, therefore the role score index of newly composed teams yielded a higher value. This can be due to the fact that their team roles in case 5 might not have been expressed and developed to its full potential. However, the same two teams ranked in the bottom part of the innovativeness rank in case 6, despite one of them achieving a rather good role score. Observation of the work process offered a good explanation: the members of the team were unwilling to fill in the questionnaires carefully and thoughtfully, as some of the members were in a hurry to leave the experiment for some reason. In addition, the members of the team were not in a mood and did not take the experiment seriously enough (their solution to the problem set was innovative but also unrealistic. Such circumstances possibly led to a bad result in innovativeness and a quite good role score (they were too generous evaluating each other, because they did not want to offend each other).

The final step included organization of the fourth and the fifth team of participants out of the participants that had expressed a maximum of two roles in the first part and whose roles did not overlap. We tried to form teams that would cover as many of the roles as possible. These two teams achieved the highest rank in combined innovativeness from both problem sets. In the first problem set, which required a quick response, both teams acted as a great team and came to brilliant solutions. Simultaneously, their high role scores were congruent to their innovativeness rank. Moreover, according to their comments, these two teams really went along well and enjoyed working together. Great work conditions, member satisfaction, roles that did not overlap and yet covered all ten of the roles, no strong personalities with than one developed role, no one that would put himself forward by any means; all these components seemed to be essential to the teams' success and innovativeness.

DISCUSSION

In this research we aimed to bring together disparate research on the effects of team role composition on innovative performance in teams by developing a theory for understanding how and why team structure has an effect on innovation. Using the experience based theory on team composition advanced by Kelley & Littman (2005), we propose a hypothesis for the effect of team roles on innovation performance. Our work can be seen as a starting point of empirical research on the role of team composition in innovation performance.

A multiple-experiment research was conducted to test our hypothesis that varied team roles are needed for better team innovativeness. This hypothesis was supported with data from three different samples and several cases within each sample. Obviously, the initial motivation for this study was to provide advice for entrepreneurs and managers on how to structure teams with the goal of attaining the best possible team performance and team member satisfaction. To examine Kelley's proposed roles we followed and recorded the work of 34 teams within a 6-month time frame. The data collected was analysed with qualitative and quantitative research methods. The results provided support for the core proposition of the Kelley's theory. The practical guidelines of a balanced team are linked to parallel theories drawn from literature, which furthermore justify the relationship between Kelley's balanced team structure and innovativeness. The empirical examination additionally complements Kelley's guidelines with unique insights: it provides recommendations on how to optimally allocate roles among members in a team and comes up with a procedure for measuring team innovativeness and composing a team.

Our research has implications for entrepreneurs and human resource professionals. Based on our findings we suggest that teams that encompass more roles are more innovative. Team roles should be allocated equally among members for better collaboration, member satisfaction and quick response, and within one team, one prevailing personality is optimal in terms of innovativeness. Teams that cover all ten roles are more innovative. We propose that managers and entrepreneurs aim to include all ten suggested roles. However, it may happen that a specific role a person plays will not be permanently present in different teams. A person might possess a predisposition for certain roles, but the nature and behaviour of the roles are dynamically dependent on other roles expressed in a team. When a specific team is organized, individuals should be tested for their roles within this specific team. In essence, the process of finding an optimal team is very much a trial and error concept and requires persistence in finding perfect balance. However, it is worth investing more time to construct the team, as innovation activity may escalate profoundly.

Limitations and future research

There are several limitations to consider. The first limitation is related to the boundary condition – the context specificity of team's work. This limitation can best be explained with

the case 6 example: different participants have different styles of engaging in the working process, which can influence team output. There is a question of whether the ten types could work together in a productive manner in every single circumstance, or whether there would arise a clash of roles that would undermine the creativity and performance of the team in certain conditions. Our results indicate that a team works in a productive manner when all ten roles are adopted and allocated equally among team members. However, future research should focus on additional verification and examination of this particular insight, paying specific attention to interactions among roles and contextual conditions.

The second limitation of the study relates to role allocation among team members and team members' possession of multiple roles. The study did not take into consideration the optimal combination and number of roles an individual member shall master. There is an opportunity for future research to determine the most compatible and complementary role groups that may be possessed by an individual member in order to maximize effectiveness.

Third, this study did not examine the importance of individual roles and how different roles affect innovation activity. There exists a need to assess contribution of individual roles to innovativeness and to determine which roles are more crucial to include in a team.

Fourth, the study was conducted in a non-stress environment. Despite the nature of problem sets being realistic, the money component was not present. People tend to accept different, less courageous choices in real life, when their decisions might have severe consequences for them or their firm. There is a need to re-conduct the study in a real environment, in particular with teams that innovate for their living. Finally, the questionnaire used in the study was developed and tested on teams of 4 to 6 members. Future work is needed in developing a questionnaire that can fit to any team size.

REFERENCES

Ahmed, P. K. (1998) Culture and climate for innovation. European Journal of Innovation Management, *1*(1), 30-43.

Amabile, T. M., Conti, R., Coon, H., Lazenby, J. and Herron, M. (1996) Assessing the work environment for creativity. Academy of Management Journal, *39*(5), 1154-1184.

Ambrose, G. and Harris, P. (2009) Design thinking. Lausanne: AVA Publishing.

Anderson, N. and Spleap, S. (2004) An evaluation of gender differences on the Belbin Team Role Self-Perception Inventory. Journal of Occupational & Organizational Psychology, *77*(3), 429-437.

Antoncic, B. (2003) Risk taking in intrapreneurship: Translating the individual level risk aversion into the organizational risk taking. Journal of Enterprising Culture, *11*(1), 1-23.

Aritzeta, A., Swailes, S. and Senior, B. (2007) Belbin's team role model: Development, validity and applications for team building. Journal of Management Studies, *44*(1), 96-118.

Baer, M. and Oldham, G. R. (2006) The curvilinear relation between experienced creative time pressure and creativity: Moderating effects of openness to experience and support for creativity. Journal of Applied Psychology, *91*(4), 963-970.

Banker, R. D., Field, J. M., Schroeder, R. G. and Sinha, K. K. (1996) Impact of work teams on manufacturing performance: A longitudinal field study. Academy of Management Journal, *39*(4), 867-890.
Barczak, G., Lassk, F. and Mulki, J. (2010) Antecedents of team creativity: An examination of team emotional intelligence, team trust and collaborative culture. Creativity & Innovation Management, *19*(4), 332-345.
Baucus, M., Norton, W., Baucus, D. and Human, S. (2008) Fostering creativity and innovation without encouraging unethical behavior. Journal of Business Ethics, *81*(1), 97-115.
Beckman, S. L. and Barry, M. (2009) Design and innovation through storytelling. International Journal of Innovation Science, *1*(4), 151-160.
Belbin, R. M. (2010) Team roles at work. Oxford: Butterworth-Heinemann.
Bell, S. T. (2007) Deep-level composition variables as predictors of team performance: A meta-analysis. Journal of Applied Psychology, *92*(3), 595-615.
Boyce, M. E. (1996) Organizational story and storytelling: A critical review. Journal of Organizational Change Management, *9*(5), 5-26.
Brown, S. L. and Eisenhardt, K. M. (1995) Product development: Past research, present findings, and future directions. Academy of Management Review, *20*(2), 343-378.
Brown, T. (2005) Strategy by design. Fast Company, *95*(June), 52-54.
Brown, T. and Katz, B. (2009) Change by design: How design thinking transforms organizations and inspires innovation. New York: Harper Business.
Brunetto, Y. and Farr Wharton, R. (2007) The moderating role of trust in SME owner/managers' decision making about collaboration. Journal of Small Business Management, *45*(3), 362-387.
Bryman, A. (2006) Integrating quantitative and qualitative research: How is it done? Qualitative research, *6*(1), 97-113.
Burpitt, W. J. and Bigoness, W. J. (1997) Leadership and innovation among teams. Small group research, *28*(3), 414-423.
Cabrales, Á. L., Medina, C. C., Lavado, A. C. and Cabrera, R. V. (2008) Managing functional diversity, risk taking and incentives for teams to achieve radical innovations. R&D Management, *38*(1), 35-50.
Clarysse, B. and Moray, N. (2004) A process study of entrepreneurial team formation: the case of a research-based spin-off. Journal of Business Venturing, *19*(1), 55-79.
Cohen, S. G. and Bailey, D. E. (1997) What makes teams work? Group effectiveness research from the shop floor to the executive suite. Journal of Management, *23*(3), 239-290.
Cohen, W. M. and Levinthal, D. A. (1990) Absorptive capacity: A new perspective on learning and innovation. Administrative Science Quarterly, *35*(1), 128-152.
DeCusatis, C. (2008) Creating, Growing and Sustaining Efficient Innovation Teams. Creativity & Innovation Management, *17*(2), 155-164.
Denzin, N. K. and Lincoln, Y. S. (1994) Handbook of qualitative research: Sage publications, inc.
Edmondson, A. C. (2002) The local and variegated nature of learning in organizations: A group-level perspective. Organization Science, *13*(2), 128-146.
Eisenhardt, K. M. and Tabrizi, B. N. (1995) Accelerating adaptive processes: Product innovation in the global computer industry. Administrative Science Quarterly, *40*(1), 84-110.
Eylon, D. (1997) An empirical test of a process model of empowerment. Journal of Management Systems, *9*, 15-30.
Farson, R. and Keyes, R. (2003) Whoever makes the most mistakes wins: The paradox of innovation. New York: Free Press.
Feeser, H. R. and Willard, G. E. (1990) Founding strategy and performance: A comparison of high and low growth high tech firms. Strategic Management Journal, *11*(2), 87-98.
Gary, L. (2003) Staying positive - without the illusions. Harvard Management Update, *8*(9), 3-5.
Geers, A. L., Handley, I. M. and McLarney, A. R. (2003) Discerning the role of optimism in persuasion: The valence-enhancement hypothesis. Journal of Personality and Social Psychology, *85*(3), 554-565.
Glynn, M. A., Kazanjian, R. and Drazin, R. (2010) Fostering Innovation in Complex Product Development Settings: The Role of Team Member Identity and Interteam Interdependence. Journal of Product Innovation Management, *27*(7), 1082-1095.

Grant, R. M. (1996) Toward a knowledge-based theory of the firm. Strategic Management Journal, *17*(Winter Special Issue), 109-122.
Hayton, J. C. and Zahra, S. A. (2005) Venture team human capital and absorptive capacity in high technology new ventures. International Journal of Technology Management, *31*(3), 256-274.
Henneke, D. and Luthje, C. (2007) Interdisciplinary heterogeneity as a catalyst for product innovativeness of entrepreneurial teams. Creativity & Innovation Management, *16*(2), 121-132.
Hmieleski, K. M. (2007). A contextual study of entrepreneur dispositional optimism: Implications for new venture performance. Paper presented at the Academy of Management Annual Meeting Proceedings, Philadelphia, PA.
House, R. J., Howard, A. and Walker, G. (1991). The prediction of managerial success: A competitive test of the person-situation debate. Paper presented at the Academy of Management, Miami, FL.
Jehn, K. A. and Mannix, E. A. (2001) The dynamic nature of conflict: A longitudinal study of intragroup conflict and group performance. Academy of Management Journal, *44*(2), 238-251.
Jehn, K. A., Northcraft, G. B. and Neale, M. A. (1999) Why differences make a difference: A field study of diversity, conflict, and performance in workgroups. Administrative Science Quarterly, *44*(4), 741-763.
Jung, D. I., Chow, C. and Wu, A. (2003) The role of transformational leadership in enhancing organizational innovation: Hypotheses and some preliminary findings. The Leadership Quarterly, *14*(4-5), 525-544.
Kamm, J. B., Shuman, J. C., Seeger, J. A. and Nurick, A. J. (1990) Entrepreneurial teams in new venture creation: A research agenda. Entrepreneurship: Theory & Practice, *14*(4), 7-17.
Kelley, T. and Littman, J. (2005) The ten faces of innovation. New York: Doubleday.
Klein, K. J. and Kozlowski, S. W. J. (2000) Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions. San Francisco, CA: Jossey-Bass.
Kogut, B. and Zander, U. (1992) Knowledge of the firm, combinative capabilities, and the replication of technology. Organization Science, *3*(3), 383-397.
Kozlowski, S. W. J. and Ilgen, D. R. (2006) Enhancing the effectiveness of work groups and teams. Psychological Science in the Public Interest, *7*(3), 77-124.
Leavy, B. (2010) Design thinking - a new mental model of value innovation. Strategy and Leadership, *38*(3), 5-14.
Leonard-Barton, D. (1995) Wellsprings of knowledge. Boston, MA: Harvard Business School Press.
Li, Y., Wang, J., Li, X. and Zhao, W. (2007) Design creativity in product innovation. International Journal of Advanced Manufacturing Technology, *33*(3/4), 213-222.
Martin, R. (2007) How successful leaders think. Harvard Business Review, *85*(6), 60-67.
Martin, R. (2009) The design of business. Boston, MA: Harvard Business Press.
Merriam, S. B. (1998) Qualitative research and case study applications in education. Revised and expanded from "case study research in education.". San Francisco, CA: Jossey-Bass Publishers.
O'Neill, T. A. and Allen, N. J. (2011) Personality and the prediction of team performance. European Journal of Personality, *25*(1), 31-42.
Oldham, G. R. and Cummings, A. (1996) Employee creativity: Personal and contextual factors at work. Academy of Management Journal, *39*(3), 607-634.
Papenhausen, C. K. (2004) Half full or half empty: The effects of top managers' dispositional optimism on strategic decision-making and firm performance. Journal of Behavioral and Applied Management, *7*(2), 103-115.
Patton, M. Q. (2002) Qualitative research and evaluation methods. Thousand Oaks, CA: Sage Publications, Inc.
.
Peeters, M. A. G., Van Tuijl, H. F. J. M., Rutte, C. G. and Reymen, I. M. M. J. (2006) Personality and team performance: a metaâ€ analysis. European Journal of Personality, *20*(5), 377-396.
Peterson, R. S., Owens, P. D., Tetlock, P. E., Fan, E. T. and Martorana, P. (1998) Group dynamics in top management teams: Groupthink, vigilance, and alternative models of organizational

failure and success. Organizational Behavior and Human Decision Processes, *73*(1998), 272-305.
Rushmer, R. K. (1996) Is Belbin's shaper really TMS's thruster-organizer? An empirical investigation into the correspondence between the Belbin and TMS team role models. Leadership & Organization Development Journal, *17*(1), 20-26.
Sakkab, N. Y. (2007) Growing through innovation. Research Technology Management, *50*(6), 59-64.
Sole, D. and Wilson, D. G. (1999) Storytelling in organizations: The power and traps of using stories to share knowledge in organizations. Training and Development, *53*(3), 44-52.
Sørensen, F., Mattsson, J. and Sundbo, J. (2010) Experimental methods in innovation research. Research Policy, *39*(3), 313-322.
Spreitzer, G. M., Kizilos, M. A. and Nason, S. W. (1997) A dimensional analysis of the relationship between psychological empowerment and effectiveness satisfaction, and strain. Journal of Management, *23*(5), 679-704.
Stewart, G. L. and Barrick, M. R. (2000) Team structure and performance: Assessing the mediating role of intrateam process and the moderating role of task type. The Academy of Management Journal, *43*(2), 135-148.
Taggar, S. (2002) Individual creativity and group ability to utilize individual creative resources: A multilevel model. Academy of Management Journal, *45*(2), 315-330.
Tang, H. K. (1998) An integrative model of innovation in organizations. Technovation, *18*(5), 297-309.
Tashakkori, A. (2006) Mixed methodology: Combining qualitative and quantitative approaches. Thousand Oaks, CA: Sage Publications, Inc.
Tjosvold, D., Yu, Z.-y. and Wu, P. (2009) Empowering Individuals for Team Innovation in China: Conflict Management and Problem Solving. Negotiation & Conflict Management Research, *2*(2), 185-205.
Volberda, H. W. (1996) Toward the flexible form: How to remain vital in hypercompetitive environments. Organization Science, *7*(4), 359-374.
West, G. P. (2007) Collective Cognition: When Entrepreneurial Teams, Not Individuals, Make Decisions. Entrepreneurship: Theory & Practice, *31*(1), 77-102.
Wong, A., Tjosvold, D. and Liu, C. (2009) Innovation by teams in Shanghai, China: Cooperative goals for group confidence and persistence. British Journal of Management, *20*(2), 238-251.
Yin, R. K. (2009) Case study research: Design and methods. Thousand Oaks: Sage Publications, Inc.

Table 1: Standardized values ranks

	Team	Role Score	Inovativeness	Role Score Rank	Inovativeness Rank	Standardized Role Score Rank *	Standardized Innovativenes Rank *
Case 1							
	Team 1	5,10	91	2	1	-0,80178	-1,33631
	Team 4	6,45	89,3	1	2	-1,33631	-0,80178
	Team 6	4,35	83,3	3	3	-0,26726	-0,26726
	Team 2	3,96	82,3	4	4	0,26726	0,26726
	Team 3	1,32	70	6	5	1,33631	0,80178
	Team 5	3,20	64,3	5	6	0,80178	1,33631
Case 2							
	Team 4	5,16	95,0	4	1	0	-1,22559
	Team 3	8,55	94,2	1	2	-1,38873	-0,77406
	Team 7	3,96	89,2	5	2	0,46291	-0,77406
	Team 8	6,72	85,0	2	4	-0,92582	0,12901
	Team 9	3,75	75,0	6	4	0,92582	0,12901
	Team 6	2,85	69,2	7	6	1,38873	1,03208
	Team 2	5,50	63,3	3	7	-0,46291	1,48361
Case 3							
	Team 2	4,48	96,3	1	1	-1,26491	-1,26491
	Team 1	4,04	88,8	2	2	-0,63246	-0,63246
	Team 3	3,68	86,3	3	3	0	0
	Team 5	3,64	85,0	4	4	0,63246	0,63246
	Team 4	1,52	67,5	5	5	1,26491	1,26491
Case 4							
	Team 1	7,10	95	1	1	-1,33631	-1,33631
	Team 3	5,76	85	2	2	-0,80178	-0,80178
	Team 2	4,88	84	3	3	-0,26726	-0,26726
	Team 5	4,65	83	4	4	0,26726	0,26726
	Team 6	2,80	76	6	5	1,33631	0,80178
	Team 4	2,96	73	5	6	0,80178	1,33631
Case 5							
	Team 1	5,32	87,5	2	1	-0,63246	-1,26491
	Team 2	4,52	85,0	3	2	0	-0,63246
	Team 3	6,12	85,0	1	3	-1,26491	0
	Team 4	3,52	74,0	4	4	0,63246	0,63246
	Team 5	2,96	62,5	5	5	1,26491	1,26491
Case 6							
	Team 5	3,48	85,0	3	1	0	-1,26491
	Team 4	7,68	74,2	1	2	-1,26491	-0,63246
	Team 3	3,00	73,8	4	3	0,63246	0
	Team 1	1,48	65,0	5	4	1,26491	0,63246
	Team 2	5,56	53,3	2	5	-0,63246	1,26491

** standardized within a case*